12-1-1993

Imyan Tehit Phonology

Ronald Gerhard Hesse

IMYAN TEHIT PHONOLOGY

by

Ronald Gerhard Hesse
Bachelor of Science, San Diego State University, 1980
Master of Science, Stanford University, 1983

A Thesis

Submitted to the Graduate Faculty

of the

University of North Dakota

in partial fulfillment of the requirements

for the degree of

Master of Arts

Grand Forks, North Dakota
December
1993

This thesis, submitted by Ronald Gerhard Hesse in partial fulfillment of the requirements for the Degree of Master of Arts from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done and is hereby approved.

Stephen A. Markett
(Chairperson)

J. Albert Bickford

Joni Meyer

This thesis meets the standards for appearance, conforms to the style and format requirements of the Graduate School of the University of North Dakota, and is hereby approved.

Harvey Knull
Dean of the Graduate School
11-18-93

PERMISSION

Title Imyan Tehit Phonology

Department Linguistics

Degree Master of Arts

In presenting this thesis in partial fulfillment of the requirements for a graduate degree from the University of North Dakota, I agree that the library of this University shall make it freely available for inspection. I further agree that permission for extensive copying for scholarly purposes may be granted by the professor who supervised my thesis work or, in his absence, by the chairperson of the department or the dean of the Graduate School. It is understood that any copying or publication or other use of this thesis or part thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to th. University of North Dakota in any scholarly use which may be made of any material in my thesis.

Signature Ronald A. Hesse

Date Nov. 10, 1993

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

This thesis would not have been possible without the willingness and friendship of the Imyan Tehit people of Haha village who graciously accepted me and my family into their community. I am especially indebted to Amos Majefat, Yoel Klafle, Yoram Sagisyolo, Aser Kameserar, Dorina Kameserar, and Yanpiet Salamuk for their friendship and interest in teaching me their language and culture. Deserving of special thanks is Don Flassy, whose writings on Tehit Jit phonology and grammar were a great help as I began this study. I am also very thankful to Cenderawasih University and the Indonesian Department of Education and Culture, under whose auspices data for this project was collected.

I wish to express my appreciation to the members of my thesis committee, Steve Marlett, Albert Bickford and Jim Meyer, for their help in correcting and giving their comments. I owe a special debt of gratitude to Steve Marlett, who chaired my committee, because of the many hours he gave to discussing this thesis and guiding me in the theoretical issues involved. I would also like to thank linguist colleagues LaLani Wood and Gloria Gravelle for the input they gave at the early stages of my analysis.

I am very grateful to Erin, my dear wife and fellow linguist, who shares my joy in the Tehit people and the beauty of their language, and knows best how to give me the vision and courage to press on.

Most of all, I wish to acknowledge the greatness of God, the wise Creator, whose gift of language to all people is fabulous in design, wondrous in beauty, infinitely intricate, and a great joy to research.

ABSTRACT

This thesis is a description of the phonology of Imyan Tehit, a West Papuan language of Irian Jaya, Indonesia, couched in the framework of templatic syllable theory espoused by Junko Itô. It is based on 18 months (1989-1991) of linguistic fieldwork, in which the author and his family lived among the Tehit of Haha village, learning their language and culture.

Imyan Tehit has a maximal syllable template [CCVVC], obligatory onsets except word-initially, and a rare liquid coda. Syllable onset, nucleus, and coda are shown to be equally autonomous sub-syllabic structures. If they are complex or branching, they attract syllable stress.

Word-final consonant clusters in Imyan Tehit call for a significant extension of extraprosodic licensing from one segment, the theoretical limit, to two, covering the entire domain of coda. Other consonant clusters, usually found root or word-initially, are broken up by non-phonemic schwa, argued to be the result of epenthesis during lexical syllabification rather than phonotactic excrescence.

Glides are shown to be the non-nuclear allophones of the ambiguous high vowels, unequivocally determined by the

syllable structure conditions and universal principles. One of these is the principle of Maximality, which maximizes the domain of prosodic licensing at the expense of extraprosodic licensing.

Monomorphemic nasal-stop sequences are argued to be tautosyllabic prenasalized stops based on the principle of Locality, their unique distribution, and patterning as a single segment with respect to stress. Alveolar prenasalized stops are excluded word-initially because of possible interference in the semantic function of the word-initial nasal agreement morphemes. Similarly, the glides and bilabial nasal are excluded from root-final position because they are reserved for suffix morphology.

The multifaceted back stop is shown to consist of four allophones, although most youths reduce these to three. A number of optional phonological processes operating on consonants involve the presence of the high front vowel, including spirantization, affrication, and anticipatory [y] epenthesis. The vowel allophones are dependent both on syllable structure and segmental environment, and are derived by the processes of laxing, raising, or assimilation.

LIST OF ABBREVIATIONS

Ø	null feature
α	binary feature variable
σ	syllable
//	phonemic transcription
[]	phonetic transcription, boundary
-	morpheme boundary
.	syllable boundary
%	mirror image environment
1pi	first person plural inclusive
1px	first person plural exclusive
1s	first person singular
2	second person
3p	third person plural
3sf	third person singular feminine
3sm	third person singular masculine
ATR	advanced tongue root
C	consonant
C'	stray consonant
Co	coda
cns	consonantal
cnt	continuant
Ex	extraprosodic
excl	exclusive
fem	feminine
G	glide
incl	inclusive
lat	lateral
masc	masculine
nas	nasal
Nu	nucleus, nuclear
On	onset
pl	plural
son	sonorant
syl	syllabic
V	vowel
voi	voice

CHAPTER ONE: INTRODUCTION

In this thesis, I explore the syllable structure of Imyan Tehit, a Papuan language of Irian Jaya, Indonesia, applying the nonlinear templatic model of Junko Itô (1986). It is based on data collected during 18 months (1989-1991) of linguistic fieldwork among the Imyan Tehit people of Haha village under the auspices of a joint working agreement between the Summer Institute of Linguistics and the Department of Education and Culture of Indonesia.

Chapter 1 provides background information about Tehit and its speakers, available literature on the language, and the theoretical framework assumed in the later analysis. Chapter 2 presents the phonemic inventory of Imyan Tehit and backs it up with phoneme contrasts in identical or similar environments.

In Chapter 3, I develop the appropriate maximal syllable template for Imyan Tehit and the conditions associated with it, based primarily on the analysis of word-medial consonant clusters. I show that Imyan Tehit has complex onsets, nuclei, and codas which attract syllable stress. Based on this, I argue that monomorphemic sequences of a nasal followed by a homorganic stop be interpreted as prenasalized stops. I also show that word-final consonant

clusters require non-standard two-segment extraprosodic licensing.

In Chapter 4, I show how the maximal syllable template and its conditions are used in the syllabification process. I also prove that syllabification correctly distinguishes glides from their vowel phonemes. I argue that the presence of schwa in the data is non-phonemic and a result of epenthesis during syllabification. In addition, I show that syllabic and non-syllabic alternations of nasal prefix morphemes require additional lexical rules.

In the final chapter, I give evidence for allophone distribution and their rules, a fair number of which are either optional or idiolectal. I show that the vowel allophones, especially, are dependent on syllable structure.

1.1. Language Classification

Tehit is one of several related Papuan (non-Austronesian) languages comprising the Toror Language Group of the western Bird's Head (Doberai) Peninsula of Irian Jaya, Indonesia. It is spoken by approximately 8,500 people, the majority of whom live in the district of Teminabuan in the regency of Sorong. Tehit is classified as West Bird's Head Stock of the West Bird's Head Family of the West Papuan Phylum (Voorhoeve 1975, Wurm and Hattori 1981, Heikkinen and Silzer 1984).

The West Papuan Phylum consists of languages of the central and western Bird's Head and various languages of the northern Moluccas. The languages of the Bird's Head, unlike the majority of Papuan languages, exhibit SVO word order and simple morphology, as opposed to SOV word order and complex verbal morphology. The West Bird's Head Family, also known as the Toror Language Group, is comprised of Tehit and four other languages: Moi, Seget, Moraid, and Kalabra. Kalabra and Moraid join with Tehit to form the West Bird's Head Stock.

Tehit is composed of eight major dialects: Jit, Mbolfle, Saifi, Imyan, Sfaryere, Fkar, Sawiat, and Salmeit (Flassy and Stokhof 1979). The language exhibits extensive geographic lexical chaining among its 30 villages, with variance in lexical non-cognates reaching some 40 percent between north and south or east and west boundary extremes (Hesse and Jung 1988). This phonology concentrates on the lexically and geographically central Imyan Tehit dialect spoken by approximately 2,000 people living in six villages in the subdistricts of Haha and Sawiat.

1.2. Tehit Culture

The boundaries of the Tehit language group coincide fairly well with and comprise the district of Teminabuan, an area roughly 60 kilometers square. Low mountain ranges of karst limestone with interspersed valleys dominate the

northern half of the territory, whereas the southern half is intertidal rivers, mangrove swamp and flat land, bounded by the sea.

Most of the Tehit are slash-and-burn farmers, growing taro, sweet potatoes, corn, and various vegetables and greens in their gardens. In the lowlands they harvest sago as a major staple and cash crop, whereas in the highlands they grow tobacco, peanuts, and mung beans for trade with other villages or for sale at the market towns of Teminabuan and Sorong. On a limited basis they raise pigs and chickens, but their main source of protein comes from fish, birds, marsupials and wild boar.

Through Dutch government and missionary efforts in the early 1900s, the Tehit stopped clan rivalries, settled into villages and adopted Christianity and formal Western education, replacing animism and traditional male initiation and training. In 1963 Dutch New Guinea was annexed to Indonesia as its easternmost province, Irian Jaya, with a resultant change in government and a continuing high commitment to rural education. Although government, schools, and church now constitute the dominant socio-political spheres, clan identity and social binding continue to be fostered by exchanges of *kain timor*, traditional cloth used as an integral part of a system of life-long installments on brideprice payment.

The Tehit have probably had trade contact with the outside world for several centuries. As a result, most older children and especially adult men are fairly bilingual in Irianese Malay, a substandard dialect of Indonesian, as a lingua franca. Indonesian is the formal language of government, school, and church, while Irianese Malay is used in town for trade and informal dealings with non-Tehit speakers. In normal village life, however, only Tehit is used. Most Tehit speakers also have a good understanding of Tehit dialects other than their own, but speak solely in their own dialect.

The Indonesian government is highly committed to education, and almost all Tehit villages have a grade school. Education is conducted in the national language, and although the Tehit people highly value education for their children, most children drop out of grade school. A few pass the entrance exam to intermediate level education at Teminabuan. Of these, only a handful continue on to high school, and those who graduate from high school do not return to live in the village, but obtain government jobs in the towns.

1.3. Literature Review

Don Flassy, linguist and native speaker of Tehit Jit, has documented the phonology of his dialect in a structural description which includes several texts and a Tehit-

Indonesian dictionary (Flassy 1978, 1979a, 1979b, 1981). More recently, he has documented Tehit Jit grammar (Flassy 1991), the first descriptive grammar of a Toror language. Works on other Toror languages include a linguistic survey of the language group (Berry and Berry 1987) and descriptive phonologies and morphologies of Kalabra (Purba and Animung 1983, 1984), Seget (Animung and Flassy 1987), and Moi (Ichwan and Fautngil 1983, 1984; Flassy 1983).

Recently a phonology of Mai Brat, a West Papuan Phylum language bordering Tehit on the east, but of the Central Bird's Head Family, was documented by William Brown (1991) using the nonlinear CV syllable theory of Clements and Keyser (1983) as applied to Papuan languages by Clifton (1987). The present thesis on Imyan Tehit, in addition to documenting the phonological processes operative in another Tehit dialect, expands linguistic knowledge through the application of nonlinear theory, specifically the templatic approach (Itô 1986), to the structure of the Tehit syllable.

1.4. Theoretical Background

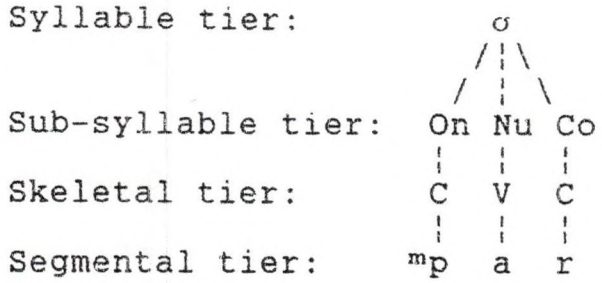
This thesis presents an analysis of the segmental and syllabic structure of Imyan Tehit, and depends on much recent theoretical work on syllable structure, which is summarized here.

The syllable, as a structural unit, has a domain that is sensitive to variations in sonority – not the binary

feature of generative phonology, but rather a range in the degree of sonority inherent in phonological segments (Bloomfield 1933:120-1; Bloch and Trager 1942:22). These segments can be ranked in a sonority hierarchy from highest to lowest as follows: vowels, glides, liquids, nasals, continuants, and stops (Selkirk 1982). The syllable consists of an optional onset (span of increasing sonority), followed by an obligatory nucleus (sonority peak), followed by an optional coda (span of decreasing sonority). In general, vocalic segments correspond to syllable nuclei, and consonantal segments constitute the onset or coda margins.

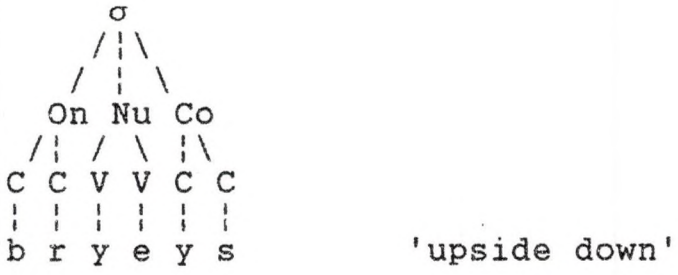
A four tier nonlinear representation of the syllable is given in (1). It consists of a segment tier dominated by a skeletal or timing tier, which in turn is dominated by the sub-syllable tier and the syllable node. The skeletal tier consists of consonantal (C) or vocalic (V) elements, which are differentiated by the feature [syllabic]. The sub-syllable tier is made up of three elements: onset (On), nucleus (Nu), and coda (Co). Although most nonlinear representations of the syllable do not give equal weight to these sub-units, I will show that this is necessary for Imyan Tehit where any branching sub-syllable structure attracts word stress.

(1) Four Tier Syllable Representation



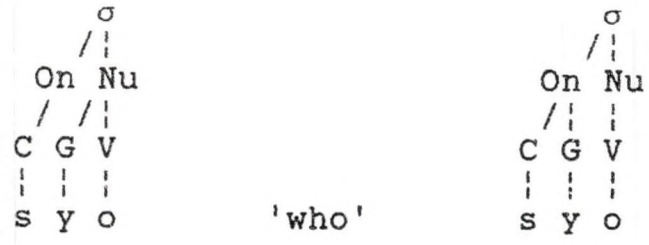
Complex sub-syllable structures, those containing more than one constituent, are shown as branching nodes. A syllable with a complex (i.e. branching) onset, complex nucleus and complex coda is illustrated below:

(2) Branching Onset, Nucleus, and Coda



Because of their high sonority, glides (symbolized below by G on the skeletal tier) might be interpreted either as part of a complex nucleus (3a) or as innermost margin material (3b). I will argue that Tehit incorporates the prevocalic glide into the nucleus.

(3) (a) Branching Nucleus (b) Branching Onset



The combining of syllable nucleus and margin into one unit is not uncommon. For many languages, the metrical analysis of stress indicates that the nucleus and coda operate together as a single unit, known as the rhyme. And for purposes of feature distribution, Goldsmith (1990:123-7) claims that many languages treat the onset-nucleus span as a single domain, restricting the duplication of distinctive features therein. For Imyan Tehit, however, the combining of syllable nucleus with margin as a prominent structure is unwarranted because it will be shown that any complex sub-syllabic unit (onset, nucleus or coda) can attract syllable stress.

Itô (1986) conceives of a language-specific skeletal template governing the process of syllabification, but subject to the principles of Prosodic Licensing, Locality and Directionality. These principles are the basic tenets of earlier prosodic theory outside the syllable.

The syllable template is a maximal sequence of skeletal tier units that constitute the full range of syllable patterns of a specific language, aside from the issue of extrasyllabicity. For example, a [CCVC] template indicates

that the language exhibits complex onsets CC. A coda position is also indicated, ensuring that closed syllables exist. Unless constrained by other language-specific conditions, the non-nuclear skeletal units are optional, implying six possible syllable patterns: CCVC, CCV, CVC, CV, VC, and V. A condition requiring onsets, for example, would eliminate the possibility of V and VC syllables. I will show that just such a condition is operative in Imyan Tehit, except word-initially. Other language-specific conditions can be placed on onset, coda, or nucleus positions to further delineate which classes of segments and clusters are permitted.

Prosodic Licensing requires that all phonological segments be licensed by (belong to) some higher level of structure. It is this principle that triggers the syllabification process to begin, whereby the phonological segments are linked up with (mapped to) the skeletal tier according to the language-specific template and its associated conditions. Segments that cannot be licensed by the skeletal tier are subject to erasure.

In many languages, single segments on the edges of words do not conform to the same patterns exhibited by word-internal syllable structure. These consonants in word-initial or word-final position are given extra freedom and are licensed by another mechanism, the principle of Extraprosodicity, which holds that edge segments of well-

defined domains are special. Because they are licensed, these extrasyllabic segments are protected from erasure during the phonological derivation. I will argue that Imyan Tehit requires the domain of extraprosodic licensing to extend beyond a single segment and encompass the entire word-final coda.

The principle of Directionality requires that the syllable-mapping process proceed in a single direction (either left to right, or right to left), intrinsic to the specific language. Directionality disambiguates the mapping of consonant clusters. Left-to-right syllabification favors the incorporation of consonants into the coda, whereas right-to-left syllabification maximizes the onset. It can be shown, however, that Imyan Tehit does not need to appeal to this prosodic principle.

The principle of Locality requires that specifications on the syllable, its template and conditions, must be completely self-contained, that is, syllable-internal. Information from outside the syllable cannot be used to ascertain the well-formedness of the syllable. Itô argues that rule-building approaches to syllabification necessarily violate this principle, and are therefore inferior to a template-based approach. Much of the analysis of well-formed syllable conditions in Imyan Tehit is based on this principle.

CHAPTER TWO: PHONEMES AND CONTRASTS

This chapter contains the phonemic inventory of Imyan Tehit (section 2.1), which is followed by evidence for phonemic contrasts (section 2.2). Allophonic variations are discussed in chapter 5.

2.1. Phonemic Inventory

As shown in Table 1, the phonemic inventory of Imyan Tehit consonants consists of a voiced bilabial stop; voiced and voiceless alveolar and back stops; a voiceless prenasalized bilabial stop; voiced and voiceless prenasalized alveolar stops; a voiced prenasalized back stop; voiceless bilabial, alveolar and glottal fricatives; bilabial and alveolar nasals; a lateral and a flap.

It should be noted that there is asymmetry in voicing between bilabial and back stops. Among the oral stops, the voiced bilabial /b/ occurs frequently in the data, whereas its voiceless counterpart /p/ does not appear at all, except in Malay or Indonesian loan words (pasa 'rice', pitis 'money', pendeta 'pastor', etc.). Among the back stop phonemes, the asymmetry is reversed. Here the voiceless /q/ is common, while the voiced phoneme /g/ is rare (most

TABLE 1 - IMYAN TEHIT PHONEMES

CONSONANTS	Bilabial	Alveolar	Velar	Uvular	Glottal
Oral Stops:	b	t d	(g)	q	
Prenasalized Stops:	^{m}p	^{n}t ^{n}d	^{ŋ}g		
Fricatives:	Φ	s			h
Nasals:	m	n			
Liquids:		l r			

VOWELS	Front	Back
High:	i (y)	
Mid:	e	o (w)
Low:	a	

---

phonetic [g] are derived from /q/ (see section 5.1.1)).[1] The prenasalized stop series is also asymmetrical with respect to voice, but just the opposite of that of the oral stop series. Here the bilabial stop is voiceless /^{m}p/, whereas the back stop is voiced /^{ŋ}g/.[2]

[1]Flassy (1981), analyzing a related dialect, Tehit Jit, posits a phonemic voiceless velar stop /k/ in addition to a voiceless uvular stop /q/.

[2]A prenasalized voiced bilabial stop /^{m}b/ does occur in Tehit Jit, a related dialect (Flassy 1981), but not its voiceless counterpart /^{m}p/.

Prenasalized stops are not common in Imyan Tehit, unlike other Tehit dialects.[3] Their frequency in the data is only three percent that of oral stops.

As for the fricatives, one should note the lack of a phonemic back fricative. Such a sound does surface phonetically as an allophone of /q/ (see section 5.1.1).

There is no high back vowel phoneme in Imyan Tehit, although the phonetic realization of /o/ is often higher than [o] (see section 5.3.4). The glides [y] and [w] are analyzed as being derived from corresponding high vowels /i/ and /o/, as determined by the Imyan syllable template (see section 4.2). An explanation of the non-phonemic epenthetic vowel [ə], commonly seen in the phonetic transcriptions of the data breaking up consonant clusters into syllables, is given in section 4.3.

2.2. Evidence For Contrast

This section provides evidence for contrasts between suspicious pairs of sounds in Imyan Tehit. The data are given both in phonemic and phonetic representation. Morpheme boundaries are indicated by hyphens. The phonemic

[3]Tehit Jit, a related dialect to Imyan Tehit, is analyzed as having voiced (but not voiceless) prenasalized stops in addition to voiced and voiceless oral stops (Flassy, 1981). Comparison of lexical cognates between the two dialects reveals that prenasalized voiced stops in Tehit Jit are much more frequent than those in Imyan Tehit, and for the most part correspond with oral voiced stops in Imyan.

representation indicates word stress (written with acute accent over the vowel) only if it does not fall on the penultimate syllable of the root morpheme. In the phonetic transcription, word stress is always indicated on multi-syllabic words.

For the consonant phoneme contrasts, the first pair of words from each set of suspicicus pairs show contrast in word-initial position. The next pair show contrast in word-internal but root-initial position. Next come examples of morpheme-internal contrast, and then examples of word-final contrast, if possible. Note that voiced stops /b,d,g/, prenasalized stops, and /h/ do not occur word-finally, and therefore cannot be contrasted in this environment.

Labials

In this section, where /o/ occurs as a syllable onset or coda, it is contrasted with other labials as a consonant.

(4) ᵐp : b	/ᵐpidi/	[mpídi]	'tinder'
	/bi/	[bi]	'smoke'
	/ᵐpasé/	[mpasé]	'outrigger float'
	/baság/	[baság]	'in the future'
	/saᵐpe/	[sámpe]	'type of sago palm'
	/sabe/	[sábe]	'tree kangaroo'
	/qᵐpas/	[qəmpás]	'type of tree'
	/qbar/	[qəbár]	'type of bird'

(5)	b : Φ	/b̲is/	[bis]	'type of tree'
		/Φ̲is/	[Φis]	'palm fiber'
		/i-b̲ot/	[ibót]	'they're good'
		/i-Φ̲ot/	[iΦót]	'they're gone'
		/m-ab̲o/	[mábo]	'it's moldy'
		/m-aΦ̲o/	[máΦo]	'her older sister'
(6)	b : m	/b̲et/	[bɛt]	'mud'
		/m̲et/	[mɛt]	'bamboo cup'
		/m-b̲ot/	[ᵐbót]	'it's good'
		/m-m̲ot/	[ᵐmót]	'it's bitter'
		/t-eb̲e/	[tébe]	'my chest'
		/t-em̲e/	[téme]	'my mother'
(7)	b : o	/b̲et/	[bɛt]	'mud'
		/o̲et/	[wɛt]	'child'
		/t-b̲irit/	[təbířit]	'I throw'
		/t-o̲irit/	[təwířit]	'I wave'
		/sib̲ar/	[síbař]	'wasp'
		/sio̲ar/	[síwař]	'fruit bat'
(8)	Φ : m	/Φ̲oq/	[Φoq]	'wild banana'
		/m̲oq/	[moq]	'moon'
		/Φ̲-ese/	[Φése]	'we (incl.) sleep'
		/m̲-ese/	[mése]	'we (excl.) sleep'
		/t-Φ̲olo/	[təΦólo]	'I slash'
		/t-m̲olo/	[təmólo]	'I dive'

	/saɸ̲ar/	[sáɸař]	'storm'
	/oam̲ar/	[wámař]	'hornbill (bird)'
	/ɸaɸ̲/	[ɸaɸ]	'we (incl.)'
	/ɸa-m̲/	[ɸam]	'the sago'
(9) ɸ : o	/ɸ̲aqa/	[ɸáʁa]	'type of banana'
	/o̲aqa/	[wáʁa]	'how many'
	/ɸ̲-noq/	[ɸənóq]	'we (incl.) know'
	/o̲-noq/	[wənóq]	'he knows'
	/t-ɸ̲it/	[təɸít]	'I pelt'
	/t-o̲ít/	[tuwít]	'I call'
	/t-siɸ̲it/	[tsíɸit]	'I carry on the head'
	/sio̲it/	[síwit]	'afternoon'
	/ɸaɸ̲/	[ɸaɸ]	'we (incl.)'
	/sɸa-o̲/	[səɸáw]	'the mountain'
(10) m : o	/m̲et/	[mɛt]	'bamboo glass'
	/o̲et/	[wɛt]	'child'
	/m̲-ono/	[móno]	'her father'
	/o̲-ono/	[wóno]	'his father'
	/t-m̲ait/	[təmáyt]	'my brother-in-law'
	/t-o̲ain/	[tuwáyn]	'I request'
	/simar/	[símař]	'mangrove tree'
	/sio̲ar/	[síwař]	'fruit bat'

/om/	[om]	'she'
/oo/	[ow]	'he'
/qla-m/	[qəlám]	'big water'
/qla-o/	[qəláw]	'small water'

Alveolars

(11) ⁿt : t	/qaⁿtaraq/	[qantářaq]	'pineapple'
	/batara/	[batářa]	'abroad'
	/qiⁿti/	[gínti]	'sand'
	/t-biti/	[təbíti]	'my ancestor'
(12) ⁿd : d	/eⁿdi/	[éndi]	'outrigger crossbar'
	/t-qedi/	[təʁédi]	'my name'
	/tleⁿde/	[təlénde]	'type of fish'
	/hrede/	[həřéde]	'door'
	/t-oⁿdié/	[tondyé]	'I forget'
	/odió/	[odyó]	'wing (of bird)'
	/o-qaⁿdíq/	[wəʁandík]	'he open-mouth clicks'
	/o-qadisen/	[wəʁadísɛn]	'it's the last one'
(13) ⁿt : ⁿd	/qiⁿti/	[gínti]	'sand'
	/eⁿdi/	[éndi]	'outrigger crossbar'
	/qaⁿtaraq/	[qantářaq]	'pineapple'
	/o-qaⁿdáq/	[wəʁandáq]	'he shut-mouth clicks'

(14)	t : d	/t̲aloq/	[táloq]	'fire pit'
		/d̲aloq/	[dáloq]	'type of tree'
		/n-t̲eie/	[nṯéye]	'you send'
		/n-d̲eie/	[nḏéye]	'you cough'
		/n-at̲e/	[náte]	'your grandparent'
		/n-ad̲e/	[náde]	'give!'
(15)	t : s	/t̲ioit/	[tíwit]	'peninsula'
		/s̲ioit/	[síwit]	'afternoon'
		/Φ-t̲ot/	[Φətót]	'our (incl.) uncle'
		/Φ-s̲ot/	[Φəsót]	'we (incl.) see'
		/t-at̲e/	[táte]	'my grandparent'
		/t-as̲e/	[táse]	'I sleep'
		/m-bot̲/	[mbót]	'she's good'
		/m-bos̲/	[mbós]	'she kisses'
(16)	t : n	/t̲omot/	[tómot]	'stick tool'
		/n̲omiq/	[nómik]	'type of sago'
		/t̲-hano/	[təháno]	'my younger sister'
		/n̲-hano/	[nəháno]	'your younger sister'
		/o-t̲a/	[wətá]	'it's end'
		/o-n̲a/	[wəná]	'his arm'
		/m-at̲e/	[máte]	'her grandparent'
		/m-an̲e/	[máne]	'island-ward'
		/t-lit̲/	[təlít]	'I visit'
		/t-lin̲/	[təlín]	'I skin (an animal)'

(17) d : n	/d̲on/	[don]	'cuscus (a marsupial)'
	/n̲ot/	[not]	'cloth'
	/m-d̲e/	[mədé]	'until'
	/m-n̲e/	[mənɛ́]	'she strips'
	/m-tod̲o/	[mətódo]	'it's stuck'
	/m-ton̲o/	[mətóno]	'it's calm'
(18) t : l	/t̲oliq/	[tólik]	'three'
	/l̲oliq/	[lólik]	'valley'
	/n-t̲oq/	[ⁿtóq]	'take it out!'
	/n-l̲oq/	[ⁿlóq]	'pick it up!'
	/m-Φot̲o/	[ᵐΦóto]	'she crosses'
	/m-Φol̲o/	[ᵐΦólo]	'she cuts'
	/bot̲/	[bot]	'soon'
	/bol̲/	[bol]	'house'
(19) d : l	/d̲ait/	[dayt]	'not'
	/l̲ait/	[layt]	'evil spirit'
	/t-d̲i/	[tədí]	'I fall'
	/t-l̲i/	[təlí]	'I wiggle'
	/qd̲a/	[qədá]	'wall partition'
	/ql̲a/	[qəlá]	'water'

(20) t : r	/t̲oliq/	[tólik]	'three'
	/r̲onit/	[řónit]	'cloth sieve'
	/m-t̲it/	[mətít]	'it's traditional'
	/m-r̲it/	[məřít]	'she lights a fire'
	/t-at̲e/	[táte]	'my grandparent'
	/t-ar̲e/	[táře]	'my father-in-law'
	/Φ-sot̲/	[Φəsót]	'we (incl.) see'
	/Φ-sor̲/	[Φəsóř]	'we (incl.) sew'
(21) d : r	/d̲aoon/	[dáwon]	'butcherbird'
	/r̲aoor/	[řáwoř]	'type of cuscus'
	/m-d̲i/	[mədí]	'it fell'
	/m-r̲i/	[məří]	'it's yellow'
	/ad̲a/	[áda]	'breadfruit'
	/ar̲a/	[áře]	'type of palm'
(22) l : r	/l̲a/	[la]	'two'
	/r̲a/	[řa]	'up there'
	/m-l̲i/	[məlí]	'it wiggles'
	/m-r̲i/	[məří]	'it's yellow'
	/t-al̲a/	[tála]	'I cut down'
	/t-ar̲a/	[táře]	'I crawl'
	/heiál̲/	[heyál]	'type of cord'
	/oiiár̲/	[wiyář]	'crocodile'

(23) n : l	/n̲aq/	[naq]	'wild breadfruit'
	/l̲aq/	[laq]	'two'
	/t-n̲oq/	[tənóq]	'I know'
	/t-l̲oq/	[təlóq]	'I pick up'
	/m-tono/	[mətóno]	'it's calm'
	/m-tol̲o/	[mətólo]	'it's enough'
	/leoen̲/	[léwɛn]	'initiation grounds'
	/leoel̲/	[léwɛl]	'cassowary tree'
(24) n : r	/n̲a/	[na]	'person'
	/r̲a/	[ř̆a]	'up there'
	/i-n̲oq/	[inóq]	'they know'
	/i-r̲oq/	[iř̆óq]	'they're many'
	/m-ron̲o/	[mər̆óno]	'her mother-in-law'
	/m-ror̲o/	[mər̆ór̆o]	'it quivers'
	/t-ron̲/	[tər̆ón]	'I live long'
	/t-ror̲/	[tər̆ór̆]	'I raise animals'

Back Consonants

(25) q : ŋg	/aqo/	[ágo]	'up there'
	/aŋgo/	[áŋgo]	'down there'
	/ooqir/	[wógɪř]	'heron'
	/o-oŋgir/	[wóŋgɪř]	'it grunts (pig)'

	/oqit/	[ógit]	'Moi race'
	/hoᵑgi/	[hóŋgi]	'type of fish'
	/m-oqo/	[mógo]	'she burns the garden'
	/moᵑgot/	[móŋgot]	'large prawn'
(26) q : g	/t-aqo/	[táʁo]	'I drink'
	/t-ago/	[tágo]	'I burn'
	/i-oqo/	[yóʁo]	'they drink'
	/ogo/	[ógo]	'banana'
(27) q : h	/qlit/	[qəlít]	'slope'
	/h̲lit/	[həlít]	'sago pudding'
	/t-qoq/	[təʁóq]	'I shave'
	/t-h̲oq/	[təhóq]	'I enter'
	/w-aqa/	[wáʁa]	'he comes'
	/w-ah̲a/	[wáha]	'he refuses'

Fricatives

(28) Φ : s	/Φ̲an/	[Φan]	'trail'
	/s̲an/	[san]	'type of bamboo'
	/o-Φ̲olo/	[wəΦólo]	'he cuts'
	/o-s̲olo/	[wəsólo]	'he asks for help'
	/m-aΦ̲í/	[mayΦí]	'it's new'
	/m-as̲í/	[maysí]	'it goes down-stream'
	/toΦ̲/	[toΦ]	'crest'
	/Φos̲/	[Φos]	'skin boil'

(29) s : h	/saq/	[saq]	'knife'
	/haq/	[haq]	'palm frond'
	/o-sat/	[wəsát]	'he cuts'
	/o-hat/	[wəhát]	'he's angry'
	/asa/	[ása]	'sugar cane'
	/t-aha/	[táha]	'I refuse'

Nasals

(30) m : n	/mam/	[mam]	'we (excl.)'
	/man/	[man]	Relativizer
	/nan/	[nan]	'you (pl.)'
	/na-m/	[nam]	'the woman'
	/t-amaq/	[támaq]	'I wear on the neck'
	/t-anaq/	[tánaq]	'my friend'

Vowels

Where possible, vowel phoneme contrasts are shown in word-initial, word-medial, and word-final positions, in stressed and unstressed pairs. Very few monomorphemic words begin with front vowels /i/ and /e/.

(31) i : e	/i̲Φót/	[iΦót]	'turtle'
	/e̲Φó/	[eΦó]	'type of fish'
	/m-i̲ió/	[miyó]	'we (excl.) put away'
	/m-e̲ió/[4]	[meyó]	'she puts away'
	/o-li̲liq/	[wəlílik]	'he rolls it'
	/o-le̲leq/	[wəléleəq]	'he turns it over'
	/m-esi̲/	[mési]	'it's cooked'
	/m-ese̲/	[mése]	'we (excl.) sleep'
	/mri̲/	[məří]	'there'
	/mre̲/	[məřé]	'one'
(32) i : a	/i̲Φót/	[iΦót]	'turtle'
	/a̲Φé/	[aΦé]	'or'
	/m-li̲s/	[məlís]	'she's tall'
	/m-la̲s/	[məlás]	'its leaf'
	/sioi̲t/	[síwit]	'afternoon'
	/sioa̲t/	[síwat]	'type of banana'
	/ni̲/	[ni]	'thing'
	/na̲/	[na]	'person'
	/t-ali̲/	[táli]	'I fold'
	/t-ala̲/	[tála]	'I cut down'

[4]The verb root in contrast here is partially suppletive, indicating number. The singular root form is /eió/ whereas the plural root form is /iió/.

(33) i : o	/i̲lit/	[ílit]	'type of sago'
	/o̲li/	[óli]	'again'
	/i̲ɸót/	[iɸót]	'turtle'
	/o̲ɸó/	[oɸó]	'then'
	/t-li̲s/	[təlís]	'I'm tall'
	/t-lo̲s/	[təlós]	'I pick (harvest)'
	/o-ami̲n/	[wámin]	'he spool-wraps'
	/o-amo̲n/	[wámon]	'his older brother'
	/m-sli̲/	[m̩səlí]	'it's dry'
	/m-slo̲/	[m̩səló]	'she pounds'
	/m-aɸi̲/	[máɸi]	'it's sour'
	/m-aɸo̲/	[máɸo]	'her older sister'
(34) e : a	/a̲oet/	[áwɛt]	'cockatoo'
	/e̲oer/	[éwɛř]	'competition'
	/n-e̲se/	[nése]	'you (pl.) sleep'
	/n-a̲se/	[náse]	'you sleep'
	/m-a̲né/	[mané]	'that one'
	/m-e̲nís/	[menís]	'she blows her nose'
	/se̲be/	[sébe]	'war chief'
	/sa̲be/	[sábe]	'tree marsupial'
	/oe̲dlá/	[wedlá]	'bachelor'
	/oa̲dlá/	[wadlá]	'man'
	/sqe̲/	[səʁé]	'type of bird'
	/sqa̲/	[səʁá]	'torch'
	/m-are̲/	[máře]	'she raises (animal)'
	/m-ara̲/	[mářa]	'she crawls'

(35) e : o	/e̲mi/	[émi]	'type of tree'
	/o̲miq/	[ómik]	'incessant'
	/e̲ɸó/	[eɸó]	'type of fish'
	/o̲ɸó/	[oɸó]	'and then'
	/t-se̲lo/	[tsélo]	'I throw'
	/t-so̲lo/	[tsólo]	'I ask for help'
	/ɸ-e̲se̲/	[ɸése]	'we (incl.) sleep
	/ɸ-o̲so̲/	[ɸóso]	'we (incl.) hear
	/qe̲/	[qe]	'these'
	/qo̲/	[qo]	'this'
	/m-abe̲/	[mábe]	'for'
	/m-abo̲/	[mábo]	'it's moldy'
(36) a : o	/a̲oo/	[áwo]	'type of rattan'
	/óoo/	[ówo]	'type of tree'
	/a̲sá/	[asá]	'type of tree'
	/o̲sió/	[osyó]	'trainee'
	/qa̲riq/	[qářik]	'type of snail'
	/qo̲riq/	[qóřik]	'pig'
	/ama̲q/	[ámaq]	'stone'
	/amo̲q/	[ámoq]	'night'
	/qa̲/	[qa]	'taro plant'
	/qo̲/	[qo]	'this'
	/t-aqa̲/	[táʁa]	'I come'
	/t-aqo̲/	[táʁo]	'I drink'

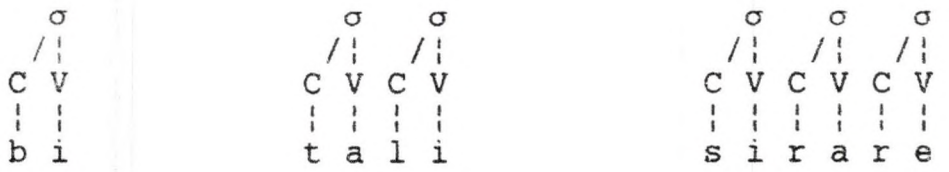
CHAPTER THREE: SYLLABLE STRUCTURE

In this chapter I apply the syllable template model to Imyan Tehit, deriving the appropriate maximal template and its associated well-formedness conditions. Data in this section are presented in quasi-phonemic form, since vowels which are not syllable peaks are represented as glides and prenasalized stops are represented as nasal-stop clusters. Where applicable, other departures from phonemic representations will be made explicit. Stress falls on the penultimate syllable of the root morpheme unless otherwise indicated.

3.1. Template and Core Syllable

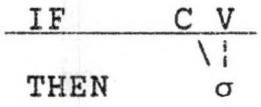
I will show that Imyan Tehit has a maximal syllable template [CCVVC], the support of which I develop throughout this chapter. Such a template allows for simple or complex onsets, simple or branched nuclei, and a simple coda, resulting in a rather large variety of possible syllable patterns. Even so, the predominant syllable type is the core syllable CV. It accounts for some two-thirds of all Tehit syllables, and is illustrated by the following examples:

(37)



The parsing of the intervocalic consonants of 'tali' and 'sirare' is made unambiguous by the Universal Core Syllable Condition (UCSC) which states that any consonant-vowel sequence is tautosyllabic (Itô 1986), as formalized below:

(38) Universal Core Syllable Condition: Any CV sequence is tautosyllabic.



The UCSC rules out the possibility of a single consonant forming the coda of one syllable followed by an onsetless syllable (*tal.i, *sir.ar.e, etc.). Rather, it requires the consonant of a CV sequence to function as an onset.

The search for more complicated Imyan Tehit syllable structure, specifically the marginal structures of coda and onset, necessarily focuses on the analysis of word-medial consonant clusters. Almost all word-medial consonant clusters in Imyan Tehit consist of two segments, one of which must be a sonorant:

(39) Word-Medial Consonant Clusters

a) Liquid - Consonant

b) Nasal - Homorganic Stop

c) Voiced Stop - Liquid

d) Consonant - Glide

There are three possible analyses available for word-medial two-consonant clusters (VCCV). First, the cluster is heterosyllabic (VC.CV), the juncture of a syllable coda with a following syllable onset. Second, the cluster is tautosyllabic, and a complex onset (V.CCV). Third, the cluster is tautosyllabic but a complex coda (VCC.V). This third possibility, however, is categorically ruled out as a violation of the Universal Core Syllable Condition.

3.2. Codas

In sections 3.4 and 3.5 it will be seen that consonant-sonorant clusters in (39c) and (39d) qualify as complex onsets and complex nuclei, respectively. However, for ease of presentation and development I begin first with the analysis of the coda and its constraints by focusing on sonorant-consonant clusters (39a) and (39b). Such clusters begin with liquids or nasals and are not very common. Consider the following words with liquids in cluster-initial position:

(40) Liquid - Consonant Clusters

mar$\underline{\Phi}$ít	'strainer'
t-ar$\underline{\Phi}$í	'I go upstream'
Φir$\underline{\Phi}$íri	'just now'
wor$\underline{s}$é	'type of fish'
qar$\underline{m}$áq	'bird of paradise'
qar$\underline{n}$á	'hibiscus flower'
bor$\underline{n}$ó	'imperial pigeon'
er$\underline{w}$ás	'animal'
Φo$\underline{l}$dí	'brush overgrowth'
ta$\underline{lh}$én	'hot'
a$\underline{lw}$oqáΦe	'wave'

I will argue that the cluster is heterosyllabic, by arguing against the tautosyllabic alternative. Two lines of evidence indicate that the liquid-consonant clusters in (40) should not be interpreted as complex onsets. First, such an interpretation would be in violation of the Sonority Sequencing Generalization (Greenberg 1978:261-270; Bell and Saka 1983:259), which prefers decreasing sonority with increasing distance from the syllable's nucleus, just the opposite of much of the above data under a complex onset analysis. Sonority reversal alone, however, is insufficient evidence to discount the possibility of a complex onset.[1]

[1]An extreme case in point is Quiegolani Zapotec, a Southern Zapotec language of Oaxaca, Mexico, which is analyzed as consisting of predominantly monosyllabic words

Even weightier evidence against a complex onset interpretation comes from the fact that there are no word-initial consonant clusters beginning with a liquid. If a language exhibits word-medial complex onsets, one should also find them in word-initial position.

The second possibility, that the liquid-consonant clusters are complex codas, has already been ruled out by the Universal Core Syllable Condition (Itô 1986:5), which requires the final consonant of the word-medial cluster to be an onset of the following vowel. The only possible interpretation left is that these consonant clusters are heterosyllabic, as shown in (41):

(41)

'imperial pigeon' 'brush overgrowth'

The above analysis of word-medial consonant clusters reveals that Imyan Tehit has a single consonant slot in coda position. An initial attempt at specifying a coda condition might be to restrict membership to sonorants, as indicated below:

with a majority of consonant clusters exhibiting sonority reversal with respect to the syllable peak (Regnier 1993).

(42) Initial Coda Condition: Obstruents are excluded from coda position.

```
*  C ]σ
   |
[-son]
```

Not all sonorants, however, are permitted in coda position, as I will now show. Consider word-medial consonant clusters of the second type. The first consonant is a nasal and the second a homorganic stop. Here the clusters are presented in their surface form:

(43) Word-Medial Nasal-Stop Clusters

sampe	'type of sago palm'
qampo	'canoe flooring'
qompoyó	'type of palm'
endi	'canoe outrigger crossbar'
hendás	'wow!'
qandehe	'type of song'
qantaraq	'pineapple'
qinti	'sand'
montiq	'woven basket
w-ongir	'it (pig) grunts'
mongot	'large prawn'

The coda condition, as currently stated, allows for nasals in coda position, which implies a heterosyllabic interpretation for nasal-stop clusters (*qin.ti 'sand').

The problem with this interpretation lies in the restricted class of consonants permitted to follow a nasal. One would expect to find nasal codas followed by any consonant class (stop, continuant, or sonorant), as is the case with liquid codas in (40). If nasal-stop clusters are heterosyllabic, this restriction that the nasal be followed by a stop violates the principle of Locality, which states that the well formedness of syllables can only be derived from syllable internal information (Itô 1986:7).

Turning to a tautosyllabic interpretation of nasal-stop clusters, there are two alternatives - coda or onset position. If viewed as a complex coda (*qint.i 'sand'), the cluster violates the Universal Core Syllable Condition. Thus the analysis is forced to the third and only remaining alternative, that the nasal-stop sequence is tautosyllabic and onset (qi.nti 'sand').[2] Although this interpretation runs counter to the predictions of the Sonority Sequencing Generalization, it remains upheld because of the higher power of the Universal Core Syllable Condition and Locality principle in eliminating alternative interpretations.

Further analysis of nasal-stop sequences is deferred until section 3.6. Of significance here, however, is the

[2]In section 3.6, evidence from syllable stress is presented favoring the interpretation of nasal-homorganic stop sequences not as two-consonant clusters but as single segments, i.e. prenasalized stops. This in no way nullifies the above argument which relegates the entire sequence to the onset.

realization that nasals are excluded from coda position, forcing the revision of the coda condition below to permit only liquids:[3]

(44) Revised Coda Condition: Only liquids are permitted as codas.

IF	C]σ
THEN	[+son]
	[+cns]
	[-nas]

3.3. Word-Final Extraprosodicity

3.3.1. Word-Final Single Consonants

Although word-medial codas are rare, more than half of Tehit words end either in single consonants or an extremely restricted two-consonant cluster. First I shall deal with single word-final consonants. In addition to liquids, which are permitted codas word-medially, the remainder of the sonorants and voiceless obstruents are found word-finally, as seen in (45).

[3]There yet exists an alternative hypothesis, that liquid-consonant sequences are not, in fact, word-medial clusters, but rather junctions of two-word compounds. If this is true, the Tehit syllable template does not allow a coda. The paucity of liquid-consonant sequences (only twelve exist in our data) and their one-sided stress pattern (consistently word-final) might be consistent with this alternative analysis. Whether the coda question is resolved or not, the fact remains that for the overwhelming majority (99 percent) of Tehit multisyllable words, only open syllables are found in word-medial position.

(45) Word-Final Single Consonants

qalit	'treehouse'
ifót	'turtle'
toliq	'three'
wiyáq	'flying squirrel'
saraΦ	'goshawk'
tenáΦ	'chip'
omos	'vine'
dowás	'type of cane grass'
Φa-m	'sago (fem.)'
hi-m	'owl (fem.)'
dawon	'butcherbird'
towón	'star'
bahel	'rack'
tiΦál	'basin'
ewar	'type of fish'
wiyár	'crocodile'
byele-w	'garden (masc.)'
səΦa-w	'mountain (masc.)'
na-y	'people'
sitá-y	'upwelling pools'

Those consonants not found in word-final position are the voiced stops (/b,d,g/), the nasal-stop sequences which I later identify as prenasalized stops (^{m}p,^{n}t,^{n}d,^{ŋ}g), and /h/, as illustrated in (46).

(46) * tib, dib, sib, lib, wib, CVb

* ted, ded, sed, led, wed, CVd

* tag, dag, sag, lag, wag, CVg

* toh, doh, soh, loh, woh, CVh

* ti^{m}p, de^{n}d, sa^{n}t, lo^{ŋ}g, CV^{n}C

These facts call for a special condition dealing with word-final consonants. If it is assumed that all sonorants and voiceless obstruents are underlyingly unspecified for voice, then only the voiced oral stops, the prenasalized stops (due to their voicing), and /h/ (due to its spread glottis feature) will have a laryngeal node during the lexical stage.[4] This laryngeal dichotomy is exploited by the following negative condition:

(47) Word-Final Single Consonant Condition: Stops with voice and /h/ cannot occur word-finally.

```
 *  C]w
      |
   Laryngeal
```

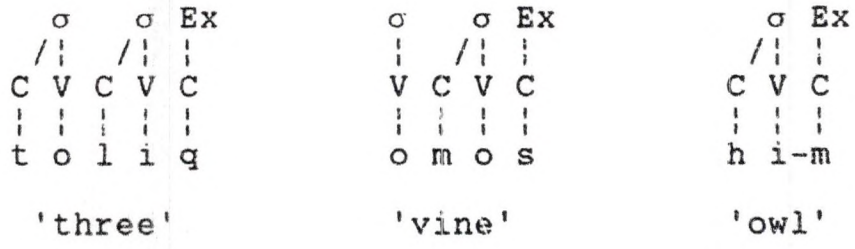
For monomorphemic and non-suffixed words, the set of restricted word-final consonants is extended to include the bilabial nasal /m/ and the glides [w,y] (from /o,i/). These phonemes are specifically reserved as consonantal word-final suffixes for a system of third person noun phrase

[4] In the postlexical phonology a feature filling rule of the form [α son] --> [α voi] would apply.

number/gender marking (see section 4.4.4). Only a single suffix slot is indicated in Tehit morphology. Thus, those consonants allowed root-finally are the voiceless obstruents (t,q,Φ,s) and the coronal consonantal sonorants (n,l,r).

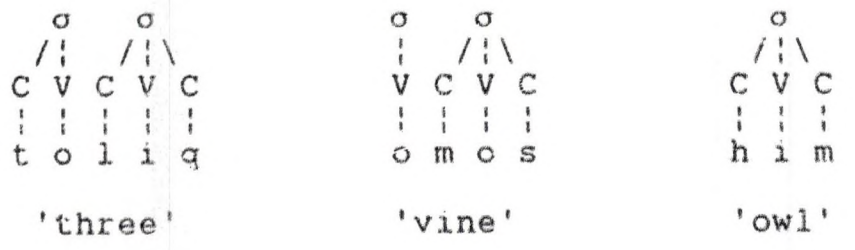
Because of the general Coda Condition (44), obstruents, nasals, and glides cannot be prosodically licensed. Instead, these segments must be extraprosodically licensed in accordance with the Word-Final Single Consonant Condition. In this way, they are protected from stray erasure during any lexical derivation cycles:

(48) Word-Final C Extraprosodic Licensing



Postlexically, extraprosodic licensing no longer applies and the previously extraprosodically licensed segments are allowed to link up as word-final codas:

(49)



3.3.2. Word-Final Consonant Clusters

Clusters of two consonants may also occur word-finally. These clusters consist of the glide [y] followed by /t,s,n/, and the vowel preceding them is always stressed, as illustrated in (50).

(50)

dayt	'not'
hə.náyt	'worm'
wə.qóyt	'tree'
tə-.lóyt	'I enter'
nə-.téyt	'your leg'
wə-.to.wéyt	'it flashes'
qays	'tongs'
tə-.báys	'I cut off'
m-.sóys	'she gives birth'
mə-.qo.dóys	'its bone'
mə.réys	'by self'
wə-.sə.qa.léys	'he trades'
hayn	'louse'
wə-.sáyn	'he wraps in leaves'
tə.qóyn	'typical'
n-.sə.róyn	'you write'
qeyn	'first'
wə-.te.réyn	'he's diligent'

In consideration of the above data I posit the following rule:

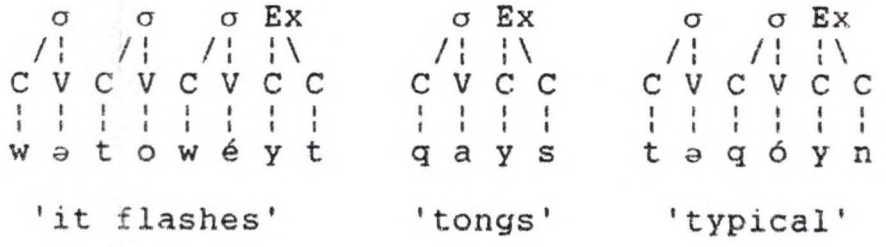
(51) Word-Final Consonant Cluster Condition: A word-final consonant cluster can only consist of the glide [y] followed by a coronal nasal or coronal voiceless obstruent:

IF	C	C]w
THEN	[y]	/t,s,n/

3.3.3. Multisegment Extraprosodicity

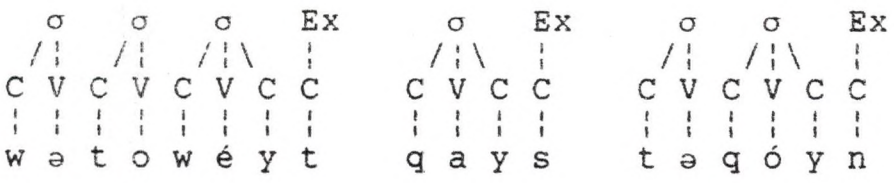
The above data indicate that word-final consonant clusters must be extraprosodically licensed as a unit, as shown below:

(52)



Such multiple-segment licensing at word boundaries is a significant deviation from standard extraprosodic licensing, which assumes room for only a single segment. But it seems there are no alternative approaches. If one were to relax the general coda condition to permit glides as codas, this would leave the final consonant to be licensed by standard single-segment Extraprosodicity as follows:

(53)



With such a relaxed coda condition, however, one would expect to find glides as codas in any position in the word (*ay.ta, *tay.sa, *rey.na, *qoy.to, etc.). But this is clearly not the case; they are only found in word-final syllables. For the same reason, the glide cannot be incorporated as a vowel into a revised syllable template [CCVVVC], implying a branched nucleus. If this were so, one would predict that non-word-final falling diphthong nuclei are possible, but there are none.

If it is assumed that only one segment of a word-final consonant cluster is allowed to be extraprosodically licensed, then the remaining consonant must either be deleted by stray erasure, or incorporated through stray epenthesis. Neither of these processes, however, are observed to be operating word-finally, and the complex glide-consonant coda remains. The Imyan Tehit data indicate that the domain of word-final extraprosodicity is not limited to a single segment, but includes the entire sub-syllabic domain of coda.

3.4. Onsets

3.4.1. Simple Onsets

Unlike the coda, no restrictions apply to simple onsets; any consonant is possible, as (54) illustrates.

(54)

mpar	'sago stem'
qa.mpo	'canoe flooring'
bol	'house'
to.ba	'type of marriage cloth'
ti.tir	'wall'
qa.taq	'sole'
dayt	'not'
a.da	'domestic breadfruit tree'
ga	'taro root'
sa.ga	'third cloth payment'
Φa.tar	'bridge'
a.Φan	'grub'
sa.be	'tree kangaroo'
ba.sáq	'in the future'
ha.nas	'louse nit'
ga.hat	'spear'
ma.baq	'raft'
qo.min	'wind'
not	'cloth'
da.nit	'handle'

l̲aq	'two'
ta.l̲i	'sun'
r̲a.da	'palm frond base'
ba.r̲et	'floor'
w̲a.mar	'hornbill bird'
to.w̲á	'bee'
y̲a.har	'ten'
qe.y̲á	'bag'

3.4.2. Complex Onsets

Complex onsets are not uncommon in Imyan Tehit and are never found in unstressed syllables. They always consist of a voiced stop followed by a liquid, as seen in (55).

(55)	breΦ	'jaw harp'
	blen	'nipa palm'
	ta.brá	'jungle'
	qə.bri.miq	'live coals'
	wə-qa.blóq	'he's naked'
	t-sa.blít	'my esophagus'
	t-a.blé	'my buddy'
	dret	'blackbird'
	dle	'myna bird'
	se.drár	'type of vine'
	ba.dlí	'imperial pigeon'
	o.dló	'nightjar (bird)'

The voiced stop-liquid clusters in word-medial position shown above cannot be parsed as heterosyllabic (*tab.ra). Stops are never followed by obstruents or nasals. Under heterosyllabic parsing, any attempt to account for these facts would violate the principle of Locality. Neither can these clusters be parsed as complex codas word-medially (*tabr.a) because that would violate both the Universal Core Syllable Condition and the Sonority Sequencing Generalization. They unequivocally indicate a complex onset (ta.bra), which is subject to the following condition:

(56) Branching Onset Condition: A cluster of two consonants may function as a syllable onset if the first consonant is a voiced stop and the second is a liquid.

IF	σ[C	C
THEN	[-son] [+voi]	[+son] [+cns] [-nas]

3.4.3. Obligatory Onset Condition

An important condition on the Tehit syllable template, however, is the stipulation that onsets are obligatory except in word-initial position, a requirement that eliminates the possibility of non-word-initial V and VC syllables. For a starting point, I posit obligatory onsets, minus the word-initial exception:

(57) Initial Obligatory Onset Condition: A syllable cannot begin with a vowel.

* σ[V

The onset requirement is deduced from the Universal Core Syllable Condition (UCSC) coupled with the observation that no true vowel sequences (*ae, *ea, *aa, *ee) exist in Tehit words. The UCSC states that a CV sequence is universally tautosyllabic, and the absence of vowel sequences eliminates the possibility of a heterosyllabic junction of vowels (V.V).

The Obligatory Onset Condition, as currently stated, would rule out words beginning with vowels. Yet, vowel-initial words are not uncommon in Tehit, accounting for some five percent of all words:

(58) Vowel-Initial Words

a.sa	'sugar cane'
a.Φis	'trap'
om	'she'
o.Φir	'type of snail'
ey	'they'
e.rén	'fish'
i.Φót	'turtle'
i.lit	'type of sago palm'

The logical attempt at salvaging the Obligatory Onset Condition is to construct the rule with sufficient context to identify and only operate on non-word-initial syllable boundaries:

(59) Revised Obligatory Onset Condition: Non-word-initial syllables cannot begin with a vowel.

*]σ σ[V

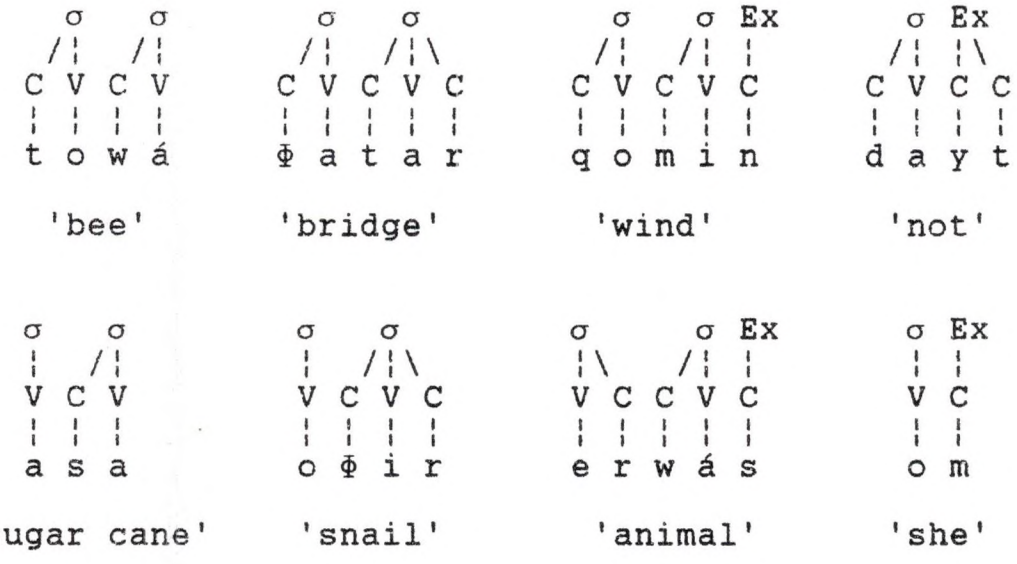
The apparent problem with this approach, however, is that the necessary context lies outside the syllable in question, and as such constitutes a breach of the Locality principle. Strict adherence to Locality requires that rules be blind to the existence of other syllables, and consequently to syllable position within a word.

Instead of having to abandon the Obligatory Onset Condition with its powerful restriction on vowel sequences, the solution to the apparent dilemma hinges on the recognition that the above condition is more than just a syllable structure condition; it is also a word structure constraint. And as such it is operative in a unique domain, the subset of the prosodic domain which excludes the first syllable.[5] The formulation of this rule necessarily ignores Locality at the syllable level.

[5]Itô (1986:157) hints at, but does not develop, a word-initial extraprosodic solution for Axininca Campa which also has obligatory onsets except word-initially: "Axininca [only] permits onsetless syllables in word-initial position.

There is no need to posit word-initial extraprosodicity for Imyan Tehit. The prosodic licensing of words beginning with and without onsets is illustrated below in (60). Those without onsets are permitted because the Revised Obligatory Onset Condition excludes the word-initial syllable from its domain of operation.

(60)



3.5. Branching Nuclei

There are three types of consonant clusters that may precede a syllable peak: stop-liquid, consonant-glide, and nasal-stop. Stop-liquid clusters form complex onsets, as was seen in the previous section. Even more common, however, is the consonant-glide cluster, consisting of a

Some version of initial extraprosodicity might be invoked to account for this. We could assume that the domain in which all syllables must satisfy the syllable structure conditions starts from the head (i.e. the vowel) of the initial syllable. This requires word-medial syllables to have onsets."

consonant followed by the front glide [y], as illustrated in (61) below. There are no limitations on consonants which may precede [y]. Note also that Cy clusters only occur in stressed syllables:

(61)	bye.le	'garden'
	si.byár	'wasp'
	ti.tyo.qo	'coconut'
	dyo	'type of hawk'
	a.dyát	'squash'
	qye.Φen	'type of flower'
	sa.qyén	'head hair'
	Φyen	'together'
	tə-.qa.Φyén	'I carry on shoulder'
	sya.man	'type of fern'
	a.mi.syá	'echidna (anteater)'
	hye	'I feel for you!'
	qa.myí	'very'
	tə-.qa.nyét	'I measure'
	lə.lyé	'ant'
	tə-.wyén	'I go get'
	qə.mpyé	'fish fence'

Just like other word-medial two consonant clusters, Cy clusters cannot be interpreted as complex codas because that would violate the Universal Core Syllable Condition and the Sonority Sequencing Generalization. In addition, the

following are reasons for interpreting word-medial Cy clusters as tautosyllabic rather than heterosyllabic clusters:

1) Tehit has clear cases of words that begin with consonant-glide clusters, indicating that complex onsets or complex nuclei occur in the language (i.e. [byéle], [dyo], [gyéΦɛn], [syáman], etc. as seen above). Not all Cy combinations are found word-initially, but enough do exist to establish this pattern for word-medial clusters as well.

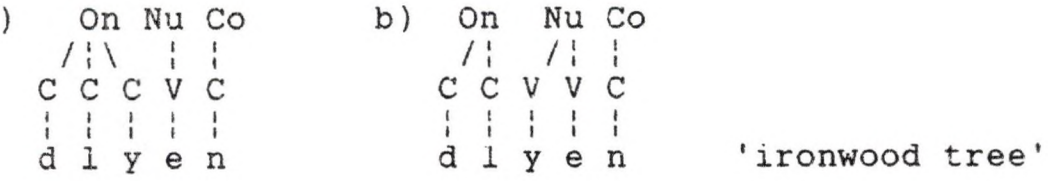
2) Any consonant except [y] may precede the glide. This pattern of non-restriction aligns closely with the freedom exhibited by simple onsets, whereas codas are shown to be considerably restricted, both word-medially and word-finally.

3) Recall that there are only four types of consonant clusters attested word-medially in Imyan Tehit (39). In some cases, the classes of consonants permitted to form a cluster are extremely limited. Voiceless obstruents, for example, can only be followed by the high front glide [y]. If Cy clusters are interpreted as heterosyllabic, then the restriction that voiceless obstruent codas be followed only by glide onsets violates the principle of Locality. Thus the only remaining alternative is a tautosyllabic analysis.

Having established that consonant-glide clusters are tautosyllabic and come before the peak, there yet remains the interesting question about the domain into which the

glide falls. Should it be interpreted as the final constituent of a complex onset, as in (62a), or as the first constituent of a complex nucleus, as depicted in (62b)? Or does it really matter?

(62) Possible Analyses of Prevocalic Glide



First, it was noted that Cy clusters only occur in stressed syllables. This was also true of complex onsets and word-final complex codas (y followed by /t,s,n/). Evidently, word stress is attracted to any syllable having a branching subsyllabic structure, whether onset, coda, or nucleus. If stress placement rules are sensitive to branching subsyllabic structures, then there is no advantage in incorporating the glide under a branching onset, as opposed to a branching nucleus. The same scansion mechanism must also identify a branching coda, so the placement of the branching sub-syllabic structure does not seem relevant.

Second, it is not the presence of a prevocalic glide alone that attracts stress, but rather a true branching structure. In the examples below, the single glide is obviously not responsible for syllable stress, as the stress alternations indicate:

(63) a.yen 'bait'

a.yí 'type of clam'

ba.yaq 'type of rattan'

tə-.bi.yán 'I slit skin (bloodletting)'

t-a.yaq 'I turn off (path)'

t-e.yáq 'I fish by torch'

qe.ye 'type of rattan'

qa.yá 'last'

wa.ye 'mango'

wi.yá 'palm cockatoo'

qo.yin 'crab'

Φo.yon 'a fungal skin disease'

In these cases the glide is functioning as a simple onset, outside the nucleus, as required by the Obligatory Onset Condition. Only in word-initial position, where onsets are not obligatory, is the word-initial glide consistently followed by a stressed vowel, as seen in (64). There are no three syllable words, however, with initial syllables of yV.

(64) Word-Initial Onset Glide Always Indicates Stress

ya.har 'ten'

ye.do 'type of sago palm'

yi.lit 'type of sago palm'

yi.hen 'type of tree'

yo.woq 'leech'

The consistent word-initial syllable stress for monomorphemic words beginning with glide [y] seem to indicate that these word-initial syllables do not have onsets, but rather consist entirely of a branching nucleus. If this observation bears out with additional data, then the branching nucleus interpretation is favored. On the other hand, if the branching nucleus analysis is abandoned, the glide is considered a simple onset, and the consistent stress pattern is unexplained.

Third, branching onsets can also be followed by glide [y], as seen in (65). This would be expected if the glide belongs to a branching nucleus. There can be no restrictions placed on onset-nucleus combinations because they constitute separate and independent subsyllabic entities.

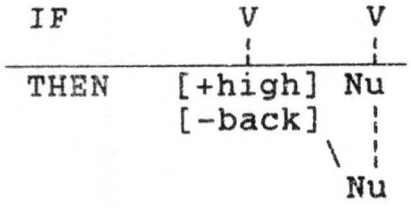
(65) brye.men 'vine bean'
brya'n 'type of tree'
qa.bryá 'type of frog'
dlyen 'ironwood tree'
mə-.qa.dlyán 'it's horizontal'

Finally, there is no advantage, but rather distinct disadvantage, in trying to always incorporate a prevocalic glide into the onset. Doing so would only complicate the structural descriptions of permissible complex onsets, forcing disjunction in the formalism of the complex onset

condition. The simpler route is to allow prevocalic glides not constrained to onset position to come under the domain of the nucleus.

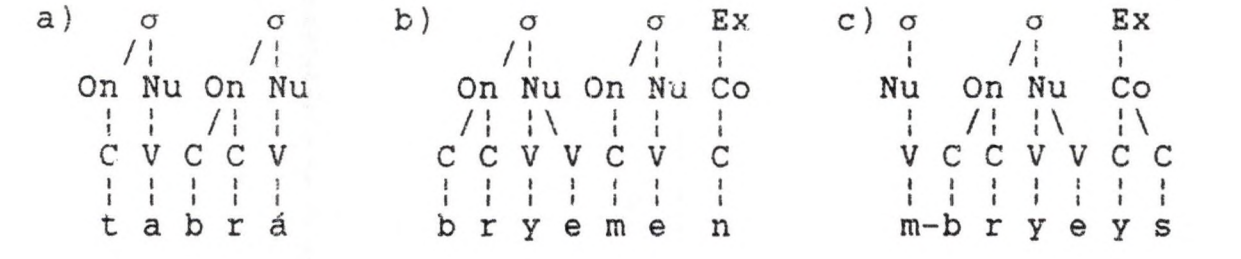
Thus, the maximal syllable template I have chosen for Imyan Tehit, [CCVVC], follows the branching nucleus interpretation of prevocalic glides (62b) rather than a branching onset interpretation which would require a three consonant onset and single vowel position [CCCVC]. It also requires an additional specification on the first vowel slot, limiting it to /i/ and restricting it from being the head of the nucleus:

(66) Branching Nucleus Condition: The first vowel of a two-vowel sequence must be /i/ and cannot function as the nucleus head.



As would be expected, branching nuclei of this type (rising diphthong) can follow any onset, i.e. there are no limitations. The syllabification of several words having complex material before the nucleus head is illustrated below in (67), showing the detail of their sub-syllabic branching structures:

(67)



3.6. Nasal-Stop Sequences

Having established that branching subsyllabic structures (onset, nucleus, or coda) attract syllable stress, I am now in a position to evaluate the status of nasal-stop sequences. Do they constitute single segments, or are they two-segment sequences? If they are two segment sequences, then the condition on branching onsets would need modification to cover their inclusion.

Although an onset nasal-stop sequence violates the Sonority Sequence Generalization, it was seen in section 3.2 that the Locality principle and the Universal Core Syllable Condition uphold the tautosyllabic onset interpretation of nasal-stop sequences. This position is further strengthened by their occurrence in word-initial position, as illustrated in (68).

(68) Word-Initial Nasal-Stop Sequences

mpar	'sago palm stem'
mpa.we	'type of tree'

mpa.sé	'canoe outrigger float'
mpe.res	'canoe anchor stick'
mpe.rit	'crowned pigeon'
mpe.yas	'type of pandanus plant'
mpi.di	'tinder'
mpo.tor	'type of tree'
mpo.mpom	'ground dove'
m-ba	'she hit'
m-bet	'it's muddy'
m-bot	'it's good'
n-ta.la	'you cut'
n-te.he	'you draw (water)'
n-ti.li	'you unwrap'
n-to	'you say'
n-di	'you fall'
n-deye	'you cough'
n-dyolo	'you hunt'

Note that for all cases other than [mp], the nasal-stop sequence is actually bimorphemic, a junction of a verbal root with its subject agreement prefix. One would also expect to find monomorphemic words, the biggest class of which is alienable nouns, beginning with [mb], [nt], and [nd], just as it does for the [mp]-initial words above, but this is not the case.[6]

[6]One reason for this discrepancy might lie with the fact that it is essential that the two agreement prefixes

Two lines of evidence point to a single segment analysis of [mp]. First, if /mp/ were two segments, then the phonemic status of both /m/ and /p/ should be able to be substantiated independently. There is no evidence, however, for /p/ as an independent phoneme. [p] is never observed in Imyan Tehit words without a preceding [m], indicating that the sequence is linked together as a single segment, a prenasalized stop. Second, if [mp] were in fact two segments, then one would expect all syllables with /mp/ onsets to be stressed, according to the previous findings for complex onsets. But this is not the case; many are unstressed as shown in (69).

(69)	qa.mpo	'canoe flooring'
	qo.mpo.yó	'type of palm'
	sa.mpe	'type of sago'
	mpa.sé	'canoe outrigger float'

In the same manner, a significant number of other nasal-stop sequences, whose stop phonemes are independently

/m-/ 'third person singular feminine' and /n-/ 'second person' not assimilate to the point of articulation of a root-initial stop. If this were the case, important semantic information would be lost. The non-assimilating nature of nasal agreement prefix is evidenced by /n-ba/ 'you hit' versus /m-ba/ 'she hits'. Perhaps the absence of monomorphemic nasal stop sequences other than [mp] can be attributed to a tendency in Tehit to ease the identification of verbs and keep the tracking of concord to distinct phonetic signals. Under this hypothesis, [mp] is allowed as a surface word-initial sequence only because there is no voiceless bilabial stop phoneme /p/ that could cause confusion as a verbal root.

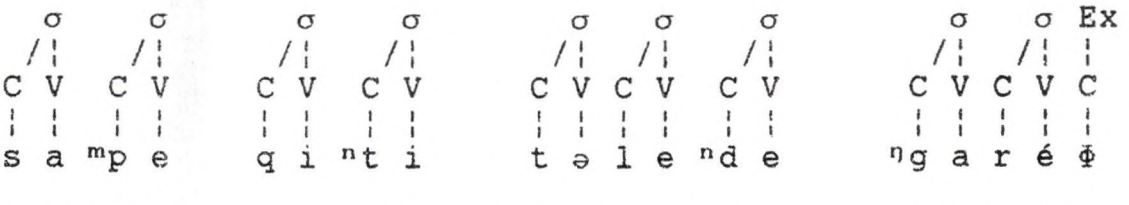
established, also fail to attract the syllable stress expected of a branching onset, as shown in (70).

(70)	tə.le.nde	'type of fish'
	e.ndi	'canoe outrigger crossbar'
	sə.ri.ntan	'jambu fruit'
	gi.nti	'sand'
	mo.ntik	'basket'
	ŋga.réΦ	'arrow'
	w-o.ŋgir	'it grunts (pig)'
	mo.ŋgot	'large prawn'

If monomorphemic nasal-stop sequences in Imyan Tehit are analyzed as prenasalized stops, however, then one would not expect stress to be attracted to syllables containing them.[7] The above data indicate a single segment interpretation, which is illustrated in (71).

[7]Prenasalized stops are not uncommon in Papuan languages. As to the existence of prenasalized voiceless stops, William Foley, a noted authority on Papuan languages, in his comparative study of six Lower Sepik languages posits a Proto Lower Sepik reconstruction having voiced and voiceless prenasalized stops (Foley, 1986:214-229). Four other language families he deals with (Marind, Marind Family; Iatmul, Ndu Family; Nasioi, South Bougainville Family; and Fore, Gorokan Family) exhibit monomorphemic homorganic nasal and voiceless stop sequences in word initial positions, some in contrast with nasal and voiced stop sequences.

(71)



[sámpe] [gínti] [təlénde] [ŋgaréΦ]

'type of sago' 'sand' 'type of fish' 'arrow'

3.7. Summary

I have developed the maximal syllable template for Imyan Tehit and its associated well-formedness conditions (summarized below in (72)) based on the characteristics of word-medial consonant clusters and the application of prosodic theory and universal principles. I have shown that the syllable template supports both branching onset and nucleus, and that branching structures attract stress. Based on this, I interpret nasal-stop sequences in Imyan Tehit to be single segment prenasalized stops rather than a cluster of two consonants. Particularly significant to nonlinear theory, I have shown that word-final consonant clusters in Imyan Tehit indicate that the domain of extraprosodic licensing must extended beyond the theoretical limit of a single segment to include an entire branching coda.

(72) Imyan Tehit Syllable Analysis:

a) CV Template: [C C V V C]

b) Obligatory Onset Condition: *]σ σ[V

(Onset obligatory except word-initially)

Branching Onset Condition:

IF	σ[C	C
THEN	[-son] [+voi]	[+son] [+cns] [-nas]

(Permitted Cluster: voiced stop - liquid)

c) Branching Nucleus Condition:

IF	V	V
THEN:	[+high] [-back]	Nu \ Nu

(Permitted Cluster: /i/ V --> [y] V)

d) Coda Condition:

IF	C]σ
THEN	[+son] [+cns] [-nas]

(Permitted Segment: liquid)

Extraprosodic Conditions:

e) Word-Final Simple Coda: * C]w

Laryngeal

(Disallowed Segment: voiced stop; /h/)

f) Word-Final Complex Coda:

IF	C	C]w
THEN	[y]	{t,s,n}

CHAPTER FOUR: LEXICAL SYLLABIFICATION

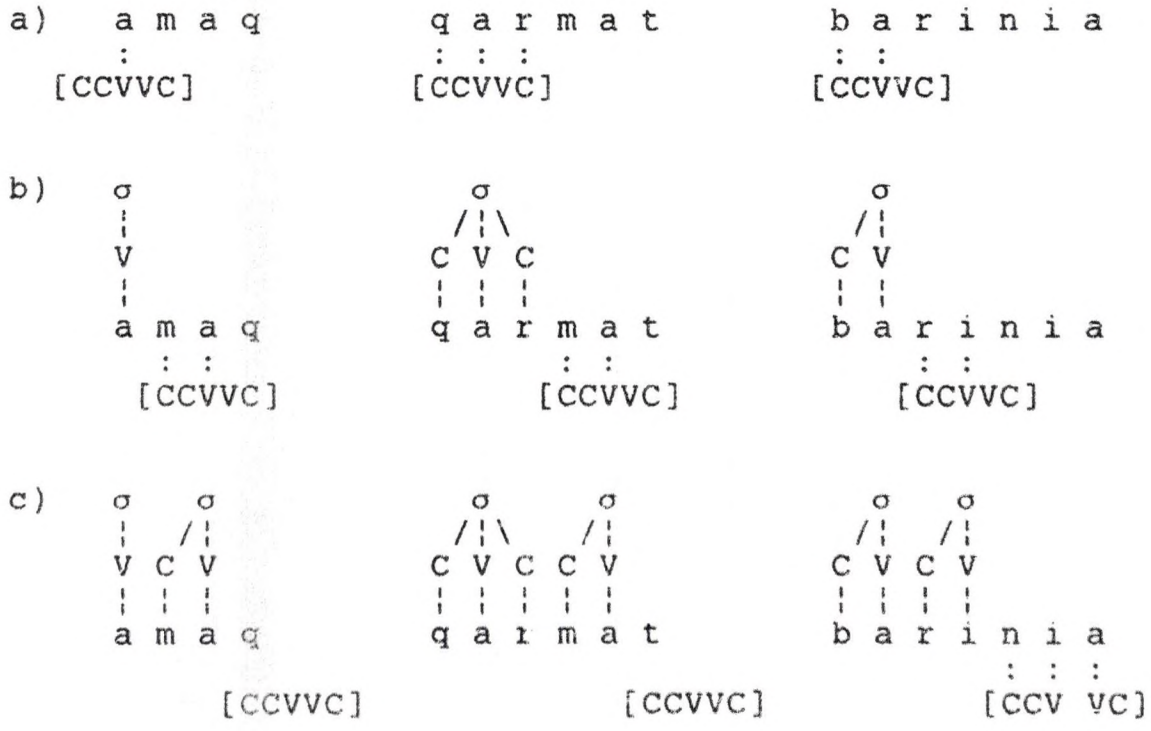
Having established the Imyan Tehit syllable template along with its conditions on onset, nucleus, and coda, I now apply these facts to the syllabification process, which is briefly explained below.

4.1. The Syllabification Process

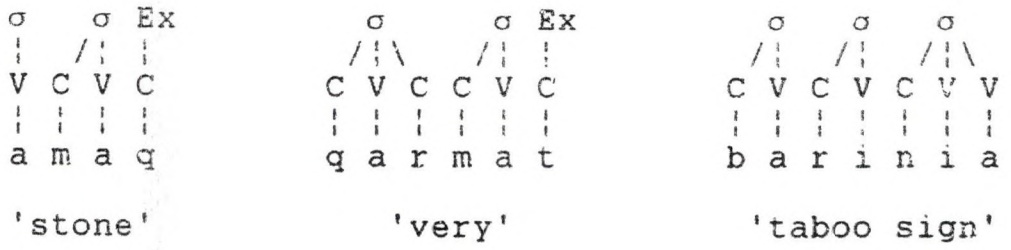
The universal phonological process begins with the lexical stage, the construction of words from their component morphemes. Throughout this stage, the lexical inputs are continually subject to the syllabification process, which constructs the nonlinear syllable structures according to the language-specific syllable template and associated well-formedness conditions. The principle of Structure Preservation monitors, and if necessary, modifies (by initiating desyllabification and resyllabification), the output of any lexical rules during the lexical derivational cycles. At the end of each lexical cycle, material which remains unsyllabified (non-prosodically licensed) and is not extraprosodically licensed, is subject to the operations of stray epenthesis, if permitted by the language, followed by stray erasure.

The syllabification process invokes the Universal Association mechanism that links vocalic segments with V slots on the skeletal tier and consonantal segments with C elements. Following Itô's templatic approach, the syllable template proceeds along the unsyllabified phonemic string in a single direction, identifying (with the help of existing syllable conditions) and mapping valid syllable structures as it goes along. I show syllabification in sequential steps in (73) and then discuss the process. For the sake of clarity, I leave out the subsyllabic tier, which results automatically from the template.

(73) Left to Right Syllabification



d)



Initial syllabification for /amaq/ 'stone' in (73a) begins with only one link, the vowel /a/, to the syllable template, because the nasal /m/ fails the coda requirement. Here, the obligatory onset condition is not applicable because the syllable is word-initial. As the template progresses to the right, in step (b), the nasal links up as onset, a position open to any single consonant, but the back stop /q/ fails as coda. In step (c), the template has progressed far enough to link up /q/ as an onset, but is prevented from doing so because there are no more vowels remaining to allow prosodic licensing. (The nuclear slot of a syllable is universally obligatory.) However, the back stop meets the requirements for word-final extraprosodic licensing, as evidenced in the final step, and the initial syllabification is complete.

In the syllabification of /qarmat/ 'very', the liquid /r/ passes the coda condition and is syllabified. The situation is different, however, for /barinia/ 'taboo sign'. Although /r/ meets the coda requirement in step (a), it is prevented from syllabifying as coda by the presence of the following vowel /i/ and the Obligatory Onset Condition. Recall also, that the Universal Core Syllable Condition

requires CV sequences to be tautosyllabic. So the /r/ syllabifies as onset of the middle syllable. In step (c) the double vowel sequence meets the branching nucleus condition of an initial /i/, and syllabifies as a single syllable (nya), instead of two (ni.a), which would have been disallowed by the Obligatory Onset Condition.

4.2. Templatic Identification Of Glides

A particularly significant and powerful aspect of the Imyan Tehit syllable template and its associated conditions is its capability of distinguishing glides [y] and [w] from their underlying "ambiguous" vowel phonemes /i/ and /o/ (as opposed to "true" vowels /e/ and /a/). Deligiorgis (1990) defines true vowels as those that always form syllable nuclei and maintain that position throughout a lexical derivation. Non-true or ambiguous vowels on the other hand are those whose syllable position is subject to universal and/or language-specific considerations of syllable structure.

In Imyan Tehit, the potentially dual status of /i/ and /o/ as vowel or glide is disambiguated by linking with the template skeletal tier units V or C, respectively. Linking to V slots as vowels is the norm. If necessary, however, the high vowels will link to the non-syllabic-peak C slots in order to yield a valid syllabification for the entire lexical input string. The syllable well-formedness

conditions and other universal principles guide the process, steering syllabification away from invalid or poorly fabricated structures.

Glide disambiguation in Imyan Tehit appeals to the Sonority Sequencing Generalization, a principle I have already applied in consonant cluster analysis, as well as the principle of Maximality. As I show below, the SSG is used to avoid tautosyllabic geminate glide clusters. Tautosyllabic geminates violate the SSG because they imply a sonority hiatus as opposed to a constant increase in sonority towards the syllable's nuclear peak. The principle of Maximality prefers prosodic licensing to extraprosodic licensing. It is simply stated as follows:

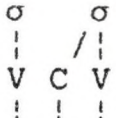
(74) Maximality: Maximize the prosodic licensing domain.

Given two possible syllable structures, Maximality chooses the structure with the least amount of extraprosodic licensing.

For every example of glide disambiguation that follows, the correct analysis is given in (a). Invalid alternative syllabifications are listed to the side along with the reason for their failure. Underlining denotes the segment or segments in violation:

Templatic Identification of Glides

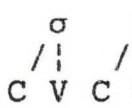
(75)



b) *á.o̲et Obligatory Onset Violation
c) *á̲o̲.et Complex Nucleus Violation

a) a.wet [áwɛt] 'cockatoo'

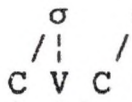
(76)



b) *bá.i̲n Obligatory Onset Violation
c) *bá̲i̲n Complex Nucleus Violation

a) bayn [báyn] 'clump of bananas'

(77)



b) *ló.o̲a Obligatory Onset Violation
c) *ló̲o̲.a Complex Nucleus Violation

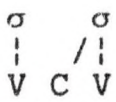
a) lo.wa [lúwa] 'snake'

(78)

b) *si.ó̲ Obligatory Onset Violation
c) *siw̲ Maximality Violation

a) syo [syo] 'who; which'

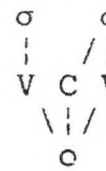
(79)



b) *wo.á̲.de Obligatory Onset Violation
c) *o̲o̲.á.de Complex Nucleus Violation
d) *ẅwá.de Complex Onset Violation

a) o.wa.de [owáde] 'morning'

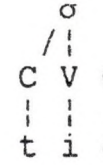
(80)



b) *ó.o͟o Obligatory Onset Violation
c) *ó͟o.o Complex Nucleus Violation
d) *oẅ͟ Complex Coda Violation
e) *wo͟w Maximality Violation

a) o.wo [ówo] 'cuckoo shrike (bird)'

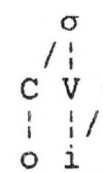
(81)



b) *tí.o͟yt Obligatory Onset Violation
c) *tí͟w.it Coda Violation
d) *tyo͟yt Maximality Violation

a) ti.wit [tíwit] 'peninsula'

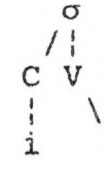
(82)



b) *wi.i͟ár Obligatory Onset Violation
c) *wyi.á͟r Obligatory Onset Violation
d) *o.yi.á͟r Obligatory Onset Violation
e) *o.y͟yár Sonority Sequence Violation
f) *oy͟.yár Coda Violation

a) wi.yár [wiyár] 'crocodile'

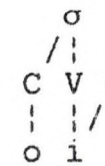
(83)



b) *yóo͟oq Complex Nucleus Violation
c) *yó͟o.oq Complex Nucleus Violation
d) *yó.o͟wq Obligatory Onset Violation
e) *i.ó͟.woq Obligatory Onset Violation

a) yo.woq [yówoq] 'leech'

(84)



b) *o.y͟yó Sonority Sequence Violation
c) *oy͟.yó Coda Violation
d) *o.yí͟w Maximality Violation
e) *wyi.ó͟ Obligatory Onset Violation
f) *wiy͟.ó Coda Violation

a) wi.yó [wiyó] 'lorikeet (bird)'

In general, if an ambiguous segment follows a vowel already linked to a nuclear V slot, then it must link up to

a C slot as a glide. If, instead, it mapped onto a nuclear V slot as a vowel, it would either,

1) create a disallowed complex nucleus, if tautosyllabic with the preceding vowel, as seen in (75-77c, 79-80c, and 83b-c), or

2) if heterosyllabic, create an onsetless syllable, in violation of the obligatory onset condition, as evident in (75-81b, 82b-d, 83d-e, and 84e).

The one exception to the above generalization is the complex nucleus. If the ambiguous vowel phoneme is preceded by the vowel /i/, then it can be linked as a vowel to the same syllable nucleus to form the peak of a branching nucleus, as seen in (78a). If in so doing, however, other conditions are violated, the structure will not stand, as seen in (82c).

An interesting case arises when the high front vowel /i/ links up as an onset [y], followed by a valid branching nucleus [y]V (see 82e and 84b), thus creating a geminate glide structure [yyV]. Tautosyllabic geminates, however, violate the Sonority Sequencing Generalization, which requires that adjacent segments on the segmental tier exhibit change in sonority, increasing in the direction of the syllable peak. Thus an alternate syllabification is indicated.

In some cases, two structures are possible, but the principle of Maximality selects the one which maximizes the

prosodic licensing domain, avoiding the structure exhibiting the most extraprosodic licensing, as seen in (78c, 80e, 81d, and 84d). Example (81) is instructive because it shows that the correct syllabification prefers a single extraprosodically licensed segment over two segments outside the prosodic domain.

The remaining invalid attempts at syllabification were excluded on the basis of violating onset (79d) and coda (80d, 81c, 82f, and 84c&f) conditions.

In general, the correct syllabification of the above examples (by default the only structure not to violate any syllable and universal conditions) resulted in a pattern of alternating C and V slots dominating the contiguous span of previously ambiguous segments.

4.3. The Status of Schwa

4.3.1. Schwa Epenthesis

Many words in Imyan Tehit contain one or two short syllables which have the mid lax vowel schwa [ə] filling the nucleus slot. Usually, these syllables are located at the beginning of the word. The schwa nucleus is interpreted as being non-phonemic, i.e. a degenerate epenthetic vowel. It does not share the full characteristics of the true phonemic vowels /i,e,a,o/. First, it is audibly shorter in length than either stressed or unstressed phonemic vowels. Second, it is never stressed, always being found in an unstressed

syllable. Third, its distribution is restricted to pretonic position, i.e. it is only able to occur in syllables preceding the stressed syllable. Because non-compound words in Tehit carry only one stressed syllable, this means that schwa is never found in a word-final syllable or in monosyllabic words.

Words containing these degenerate syllables are interpreted as having underlying consonant clusters. The following examples illustrate one and two degenerate syllables in word-initial position (85a-b), and also in word-medial position (85c):

(85) Epenthetic Schwa Word-Initial and Word-Medial

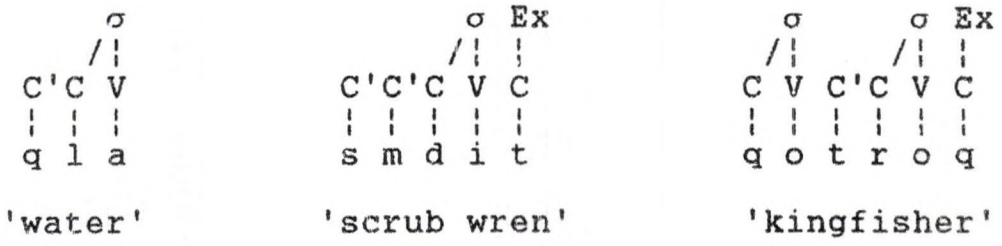
a)	/tbió/	[təbɨó][1]	'fire starter'
	/tho/	[təhó]	'fish net'
	/qsa/	[qəsá]	'manufactured'
	/qla/	[qəlá]	'water'
	/Φqeit/	[Φəʁéyt]	'freshwater crab'
	/sraq/	[səřáq]	'type of marriage cloth'
	/hlit/	[həlít]	'sago pudding'
	/mdis/	[mədís]	'pandanus plant species'
	/mno/	[mənó]	'pandanus plant species'
	/qrmoq/	[qərmóq]	'moss'

[1]See section 5.3.2. for a discussion of glide assimilation.

b)	/qmnién/	[qəmənyʕn]	'type of fish'
	/qnoai/	[qənəwáy]	'sea gull'
	/qtqe/	[qətəʁé]	'gecko lizard'
	/qtle/	[qətəlé]	'jambu fruit'
	/smdit/	[səmədít]	'scrub wren'
	/qnoato/	[qənəwáto]	'cliff overhang'
c)	/aɸlili/	[aɸəlíli]	'type of long bean'
	/satqaɸa/	[satəʁáɸa]	'type of bat'
	/satmór/	[satəmór]	'quiet'
	/oaqrió/	[waʁəřyó]	'ground dove'
	/qotróq/	[qotəróq]	'kingfisher'
	/taqdáq/	[taʁədáq]	'warbler (bird)'
	/mamlé/	[maməlé]	'master'

The consonant clusters in the above examples do not fit the requirements for complex syllable onsets in (a,b) or codas in (c). Furthermore, because of the absence of phonemic vowels, they cannot syllabify unless a nucleus slot is supplied through an epenthetic operation. Initial syllabification of the above yields partially syllabified words, with stray (unsyllabifiable) consonants marked as C' below:

(86)



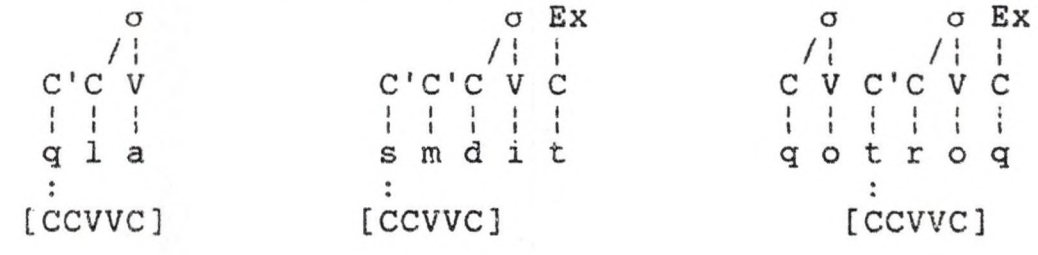
If stray epenthesis were not operative in Imyan Tehit, the process of stray erasure, which is claimed to be operative in every language at the end of each lexical cycle, would yield *la 'water', *dit 'scrub wren' and *qoroq 'kingfisher' for the above examples. But stray epenthesis is parameterized as "on" or functional for Tehit, according to the following epenthesis directive:

(87) Map stray consonants to the syllable template.

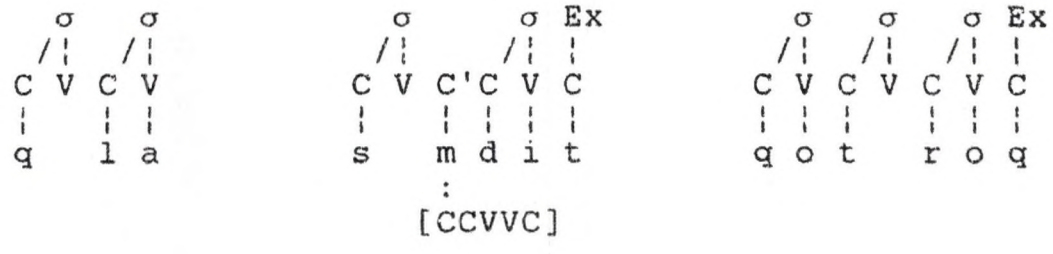
Stray epenthesis is ordered directly before stray erasure in the lexical cycle and in essence bleeds any visible effects of the universal stray erasure mechanism with respect to stray consonants. The process is illustrated below:

(88) The Stray Epenthesis Process

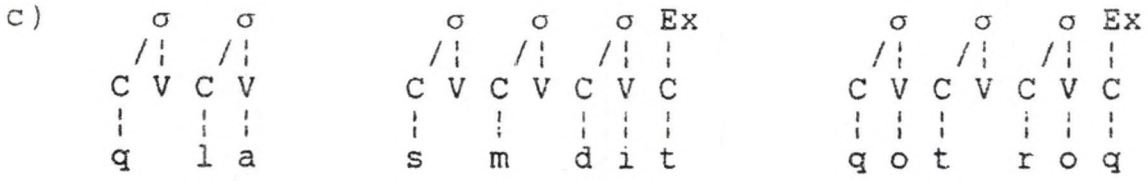
a)



b)



c)



In step (88a) above, the syllable template docks next to the unsyllabified consonant. There is no ambiguity as to whether the stray consonant must link up as onset or coda, due to the coda condition restricting all but liquids. The nuclear slot of the syllable is guaranteed because it is universally obligatory. Hence, the specifications for a minimal syllable are met, as seen in step (88b). Default rules later fill in the epenthetic vowel quality as schwa in the postlexical stage. The epenthesis operation necessarily creates two syllables for /smdit/ 'scrub wren' because of the three consonant cluster /smd/, none of which can function as coda.

Itô (1986:10) claims that the nonlinear principle of directionality plays an explanatory role in syllable mapping theory, making it possible to correctly parse ambiguous intervocalic consonant clusters and correctly predict the insertion sites for complex systems of epenthesis. Left-to-right template mapping maximally incorporates segments into the coda, whereas right-to-left mapping maximizes the onset.

It is not necessary, however, for all languages to be parameterized for directionality. Imyan Tehit is such a

case. Because its syllable template and associated well-formedness conditions are sufficiently complex, a unique syllabification results, regardless of the direction of template application. Thus, for Imyan Tehit, directionality offers no useful role in the syllable structure and does not need to be referred to in the grammar. Although the above derivations of initial syllabification and epenthesis depict the mapping process as proceeding from left to right, the same results would have been obtained by proceeding in the opposite direction.

4.3.2. Excrescent Vowel Hypothesis

An alternative interpretation for Tehit schwa is that it is an excrescent non-phonemic vowel, as opposed to epenthetic non-phonemic vowel. This interpretation would follow Hyman (1990) in assuming that not all languages have exhaustive syllabification. Bagemihl (1991), for example, holds this position for Bella Coola, a Salish language from coastal British Columbia. Segments which could not syllabify would simply be left as stray and Tehit would become another exception to Itô's claim that stray erasure is universal. Phonetically, the insertion of the excrescent vowel would be triggered, not by stray consonants, but rather by the need to mediate a transition between two adjacent articulations having constriction in the oral tract.

Levin (1987) posits two other characteristics of excrescent vowels: 1) they tend toward schwa, but can vary with the environment, their quality not necessarily corresponding to any of the underlying vowel qualities in the language; and 2) they are not referred to by any phonological rules. Although various instances of schwa in Tehit can be shown to vary in quality toward that of a following phonemic vowel (see section 5.3.5), the crucial evidence against an excrescent vowel interpretation comes from the phonological rule of back stop spirantization in intervocalic position, given in section (5.1.1). Here, the schwa satisfies the vocalic environment condition just as well as any phonemic vowel (compare /qtqe/ [qətəʁé] 'gecko lizard' and /qaqois/ [qaʁóys] 'tear duct').

4.3.3. Vowel Reduction Hypothesis

Yet a third possible interpretation of Tehit schwa is that it is a reduced form of an unstressed phonemic vowel, most probably the low central vowel /a/, which is closest phonetically to [ə]. The problem with such a position, however, is that unstressed /a/ shares similar environments with schwa, and there is no straightforward way of predicting why some words would exhibit reduced vowels whereas others would be left unaffected, as exhibited by the following contrasts:

(89) Contrasts between Schwa and Unstressed /a/

[qəsá]	'manufactured'
[qasánaq]	'brown frog species'
[məʁán]	'its body'
[maʁán]	'dog'
[qəmís]	'black ant species'
[qamyí]	'very'
[təbɨó]	'fire starter'
[tabót]	'incessant'
[qərít]	'yam'
[qarí]	'fruit dove'

A second argument against phonemic unstressed vowel reduction comes from the distribution of surrounding consonants. In Imyan Tehit, unstressed vowels can be surrounded front and back by the same consonant phoneme, if voiceless obstruent or liquid (tVt, qVq, fVf, sVs, rVr, lVl). The schwa, however, never appears in such an identical consonant sandwich. If schwa is derived from unstressed phonemic vowels, this break in the pattern is completely unexplained. If however, schwa is epenthetic, this distributional pattern directly falls out as a direct result of the Obligatory Contour Principle, which requires adjacent segments on the segmental tier to be unique.

A third argument against reduced unstressed vowels comes from native speaker orthographic reaction to the language. Almost invariably, Tehit speakers attempting to

write Tehit words will not write any vowel for the non-phonemic schwa, but will rather write the underlying consonant clusters. This is significant when considering that many of these speakers are also somewhat literate in Indonesian, which often uses the written vowel /e/ for schwa. Yet despite this known orthographic device, they still prefer to avoid a vocalic representation of schwa in their own language.

4.4. Morphophonemic Processes

Having established the epenthetic nature of schwa in Tehit monomorphemic words, I now turn to the morphophonemic process in Tehit of agreement marking. A wide variety of word classes in Tehit are marked for agreement with a nominal referent by an agreement prefix morpheme. These include verbs, statives, adjectives, inalienable nouns, prepositions, and conjunctions. The agreement prefixes derive from a single set which distinguishes person, number, and gender, as seen below:

(90) Tehit Agreement Morphemes

t-	1s	(first person singular)
n-	2	(second person)
o-	3sm	(third person singular masculine)
m-	3sf	(third person singular feminine)

m-	1px	(first person plural exclusive)
Φ-	1pi	(first person plural inclusive)
i-	3p	(third person plural)

Note that gender is distinguished only in third person singular; first person plural differentiates between inclusive and exclusive forms; second person is ambiguous for number; and third person singular feminine is ambiguous with first person plural exclusive. The two nasal agreement morphemes necessarily contrast bilabial and alveolar articulation.

As would be expected, all agreement morphemes that attach to vowel-initial roots, syllabify as onsets:

(91)	t-ono	[tóno]	'my father'
	n-ono	[nóno]	'your father'
	o-ono	[wóno]	'his father'
	m-ono	[móno]	'her/our(excl.) father'
	Φ-ono	[Φóno]	'our(incl.) father'
	i-ono	[yóno]	'their father'

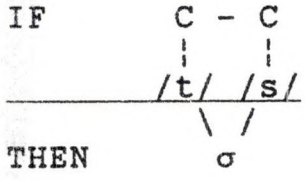
4.4.1. Obstruent Prefixes

Also as expected, the obstruent prefixes (/t-/ and /Φ-/) syllabify as onsets of degenerate syllables when prefixed onto consonant-initial roots, as seen in (92).

(92)	t-ba	[təbá]	'I hit'
	Φ-ba	no data	'we(incl.) hit'
	t-to	[tətó]	'I say'
	Φ-to	[Φətó]	'we(incl.) say'
	t-di	[tədí]	'I fall'
	Φ-di	[Φədí]	'we(incl.) fall'
	t-qesi	[təʁési]	'my aunt'
	Φ-qesi	[ΦəʁésiΦ]	'our(incl.) aunt'
	t-Φlan	[təΦəlán]	'I stab'
	Φ-Φlan	no data	'we(incl.) stab'
	t-sese	[tsése]	'I run'
	Φ-sese	[Φəsése]	'we(incl.) run'
	t-hot	[təhót]	'I see'
	Φ-hot	[Φəhót]	'we(incl.) see'
	t-mlan	[təmələn]	'I'm light weight'
	Φ-mlan	[Φəmələn]	'we're light weight'
	t-noq	[tənóq]	'I know'
	Φ-noq	[Φənóq]	'we(incl.) know'
	t-leli	[təléli]	'I sit'
	Φ-leli	[Φəléli]	'we(incl.) sit'
	t-rana	[təřána]	'I tell'
	Φ-rana	[Φəřána]	'we(incl.) tell'
	t-oare	[təwáře]	'I wash'
	Φ-oare	[Φəwáře]	'we(incl.) wash'
	t-iit	[təyít]	'I sharpen'
	Φ-iit	[Φəyít]	'we(incl.) sharpen'

The one exception to the above pattern is /t-/ prefixed onto a root-initial /s/. The /t/ is incorporated into the initial syllable of the root, and the /ts/ cluster forms a complex onset, as seen in /t-sese/ [tsése] 'I run'. Such clusters are only known to occur word-initially, as a result of the agreement morphology. This necessitates a secondary onset condition that applies after the initial lexical cycle:

(93) An alveolar voiceless stop - fricative cluster /ts/ spanning a morpheme boundary is tautosyllabic:



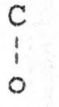
4.4.2. Vowel Prefixes

The vowel prefixes (/o-/ '3sm' and /i-/ '3p') syllabify either as glide onsets or vowel nuclei, depending on the class of consonant-initial roots onto which they prefix. For the most part, /o-/ syllabifies as an onset glide [w], creating a degenerate syllable, as shown below:

(94)	o-bot	[wəbót]	'he's good'
	o-to	[wətó]	'he said'
	o-dihár	[wədihář]	'he looks for'
	o-qaq	[wəʁáq]	'he died'
	o-ɸlan	[wəɸəlán]	'he stabs'

o-salo	[wəsálo]	'he speaks'
o-hot	[wəhót]	'he sees'
o-molo	[wəmólo]	'he dives (fishing)'
o-noq	[wənóq]	'he knows'
o-loq	[wəlóq]	'he picks up'
o-ri	[wəří]	'it's yellow'
o-oet	[wəwét]	'he is small'
o-ian	[wiyán]	'he rubs'

Remember that onsetless syllables are allowed word-initially in Imyan Tehit. Because the agreement morpheme in the data does not surface as a word-initial vowel, I conclude that underlyingly it is prelinked to a C slot in the lexicon:

(95)


'3sm'

Occasionally, however, the data include examples with / syllabified as a syllable nucleus, as given below:

(96)	o-bu	[obá]	'he hits'
	o-ɸot	[oɸót]	'it's done'
	o-mian	[omɨán]	'it's dark'
	o-oaq	[owáq]	'he names'
	o-soro	[osóřo]	'its current'
	o-looá	[oluwá]	'he's amiable'

I propose that these roots form a separate class which require an essentially suppletive allomorph, a nuclear /o/. Schwa epenthesis therefore does not apply.

Even greater variability is exhibited by the third person plural agreement morpheme /i-/. Consider the following:

(97)	i-ba	[yəbá]	'they hit'
	i-bot	[ibót]	'they're good'
	i-teit	[yətéyt]	'their legs'
	i-to	[itó]	'they said'
	i-dahan	[yədáhan]	'they're dirty'
	i-driq	[idřík]	'they enter'
	i-qaq	[yəʁáq]	'they died'
	i-Φlan	[yəΦəlán]	'they stab'
	i-Φla	[iΦəlá]	'they possess (spirit)'
	i-sain	[yəsáyn]	'they wrap in leaves'
	i-sret	[isəřɛ́t]	'they're wet'
	i-hot	[yəhot]	'they see'
	i-mhes	[yiməhɛ́s]	'they're smooth'
	i-ne	[yəné]	'they carve'
	i-noq	[inóq]	'they know'
	i-laq	[yəláq]	'they assemble'
	i-leli	[iléli]	'they sit'
	i-rana	[yəřána]	'they tell'
	i-roq	[ɐřóq]	'they are many'

i-oás	[yəwás]	'they are delicious'
i-oere	[iwɛ́ře]	'they turn aside'
i-iit	[iyít]	'they sharpen'

Again, the majority of verbal roots take non-nuclear degenerate syllable agreement. I will assume, then, that the plural agreement morpheme is prelinked to a C slot in the lexicon, as depicted in (98).

(98)

Those roots requiring nuclear agreement of /i-/, then, are relegated to a special class, specifically marked in the lexicon, which take a suppletive vocalic allomorph.

4.4.3. Nasal Prefixes

The nasal prefixes function as syllable nuclei if the following root begins with a consonant having the same point of articulation, as illustrated in (99). Otherwise, schwa epenthesis generally occurs.

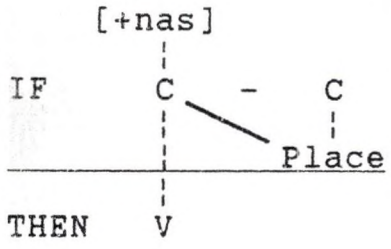
(99) Syllabic Nasal - Homorganic Consonant Agreement

m-bait	[m̩báyt]	*[məbáyt]	'she plays'
n-bait	*[n̩báyt]	[nəbáyt]	'you play'
m-mro	[m̩məřó]	*[məməřó]	'she longs for'
n-mro	*[n̩məřó]	[nəməřó]	'you long for'

m-oare	[m̥wáře]	*[məwáře]	'she washes'
n-oare	*[n̥wáře]	[nəwáře]	'you wash'
m-tono	*[m̥tóno]	[mətóno]	'it is still'
n-tono	[n̥tóno]	*[nətónc]	'be still!'
m-dehe	*[m̥déhe]	[mədéhe]	'we fence it off'
n-dehe	[n̥déhe]	*[nədéhe]	'you fence it off'
m-noq	*[m̥nóq]	[mənóq]	'she knows'
n-noq	[n̥nóq]	*[nənóq]	'you know'
m-laq	*[m̥láq]	[məláq]	'she puts it down'
n-laq	[n̥láq]	*[nəláq]	'you put it down'
m-rana	*[m̥řána]	[məřána]	'she tells'
n-rana	[n̥dřána]	*[nəřána]	'you tell'
m-qaΦe	*[m̥ʁáΦe]	[məʁáΦe]	'she carries'
n-qaΦe	*[n̥ʁáΦe]	[nəʁáΦe]	'you carry'
m-hot	*[m̥hót]	[məhót]	'she sees'
n-hot	*[n̥hót]	[nəhót]	'you see'
m-ian	*[m̥yán]	[miyán]	'she rubs'
n-ian	*[n̥yán]	[niyán]	'you rub'

To handle the above cases of nasal agreement, I posit the following rule which applies before schwa epenthesis in the lexical cycle. The existence of the morpheme boundary ensures that it is not operative in the initial lexical cycle:

(100) Syllabic Nasal - Homorganic Consonant Agreement: A nasal agreement morpheme followed by a homorganic root-initial consonant is syllabic:



Roots beginning with fricatives are a special case, as the data in (101) illustrate:

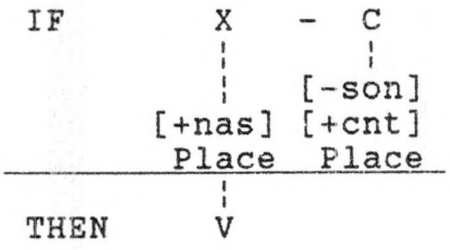
(101)	m-ɸolo	[m̩ɸólo]	*[məɸólo]	'she chops'
	n-ɸolo	[n̩ɸólo]	[nəɸólo]	'you chop'
	m-ɸrio	[m̩ɸəřyó]	*[məɸəřyó]	'it blows'
	n-ɸrio	[n̩ɸəřyó]	*[nəɸəřyó]	'you blow'
	m-smit	[m̩səmít]	*[məsəmít]	'she looks at'
	n-smit	[n̩səmít]	*[nəsəmít]	'you look at'
	m-sat	[m̩sát]	[məsát]	'she cuts'
	n-sat	[n̩sát]	*[nəsát]	'you cut'

If the agreement morpheme and root-initial fricative differ in point of articulation, the nasal can optionally syllabify as a nucleus. If, however, the root-initial fricative is followed by another consonant, rather than a phonemic vowel, schwa epenthesis separates the root-initial cluster in the first lexical cycle, and in the second cycle, the nasal agreement morpheme must syllabify as nuclear peak,

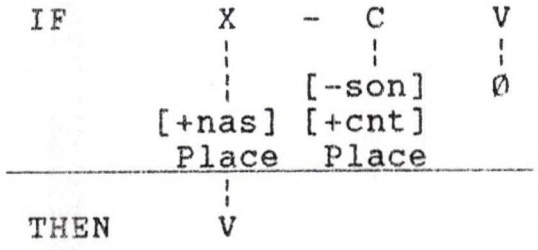
as seen in /n-Φrio/ [nΦəřyó] *[nəΦəřyó] 'you blow', and /m-smit/ [msəmít] *[məsəmít] 'she looks at'.

To handle the above cases of nasal agreement with fricative roots, I posit two additional rules which apply after (100) but before schwa epenthesis in the lexical cycle.

(102) Optional Syllabic Nasal - Non-homorganic Fricative Agreement: A nasal agreement morpheme followed by a non-homorganic root-initial fricative, may optionally be syllabic.



(103) Syllabic Nasal - Non-homorganic Fricative Cluster Agreement: A nasal agreement morpheme followed by a root-initial degenerate syllable (V linked to Ø) with a fricative non-homorganic onset is syllabic:



4.4.4. Suffix Morphology

The Imyan Tehit noun phrase can be marked for number and gender with a simple suffix, using the same third person morphemes which are used by the prefix agreement set:

(104) Tehit Suffix Morphemes

-m	3sf	(third person singular feminine)
-o	3sm	(third person singular masculine)
-i	3p	(third person plural)

In brief, third person gender/number marking only occurs on vowel-final roots. If the last word of a noun phrase ends in a vowel, that word may include the suffix denoting the gender and number of the head noun. Also, if a transitive verb ends in a vowel and the object noun phrase does not follow, the verb may include the suffix, denoting the number and gender of the displaced, missing or understood object. Both cases are illustrated below:

(105)

na-m	[nam]	'person (fem.)'
na-o	[naw]	'person (masc.)'
na-i	[nay]	'people'
na qo-m	[na qom]	'this person (fem.)'
biele-o	[byélew]	'garden (masc.)'
m-bahe-m	[mbáhem]	'she orders her/it'
m-bahe-o	[mbáhew]	'she orders him'
m-bahe-i	[mbáhey]	'she orders them'

Φ-ba-m	[Φəbám]	'we (incl.) hit her/it'
Φ-ba-o	[Φəɓáw]	'we (incl.) hit him/it'
Φ-ba-i	[Φəbáy]	'we (incl.) hit them'
t-slo-m	[tsəlóm]	'I pound it (fem.)'
t-slo-o	[tsəlów]	'I pound it (masc.)'
t-slo-i	[tsəlóy]	'I pound them'

Because gender/number marking only occurs on vowel-final roots, the ambiguous vowel suffixes /-o/ '3sm' and /-i/ '3p' always syllabify as word-final codas, not as syllable nuclei.

4.5. Summary

I have shown how the syllabification process creates well-formed syllables from the lexical inputs using the Imyan Tehit maximal syllable template and its associated conditions. Because of its unique structural conditions, Imyan Tehit does not need to appeal to the principle of directionality to guide the process.

Syllabification was also shown to correctly distinguish the glide allophones [y,w] from their underlying vowel phonemes /i,o/. Potentially ambiguous syllabification is disambiguated by application of the principle of Maximality which favors prosodic over extraprosodic licensing.

Schwa is seen to be non-phonemic and is argued to be the result of epenthesis in the lexical cycle, salvaging

stray, unsyllabified consonants from erasure. An alternative non-phonemic interpretation of schwa as phonotactic excrescence is ruled out because schwa contributes to the environment of a postlexical rule.

Additional lexical rules preceding schwa epenthesis were found to be necessary to distinguish syllabic and non-syllabic manifestations of nasal prefix morphemes. Vowel prefix morphemes take a suppletive syllabic form for certain classes of inflected roots. Finally, suffix morphemes never function as syllable nuclei because they are restricted to vowel-final roots.

CHAPTER FIVE: ALLOPHONIC RULES

In this final chapter, the allophonic rules of Imyan Tehit are presented. Consonant allophones are discussed in section 5.1, focusing first on the back stop, followed by optional processes involving consonants (section 5.2). Vowel allophones are discussed in section 5.3.

5.1. Consonant Allophones

5.1.1. Back Stop

The back stop /q/ has four allophones - voiceless uvular stop [q], voiced uvular fricative [ʁ], voiced velar stop [g], and voiceless velar stop [k]. Many youths, however, reduce the two uvular allophones to glottal stop [ʔ]. The distribution of the back stop allophones depends on position in the word and the adjacent vowel.

Allophones [k] and [g]

A back stop adjacent to a high front vowel /i/ is fronted to velar position and is voiced everywhere except in word-final postion (i.e., voiced [g] as onset, voiceless [k] as coda). The data in (106) below shows /q/ voiced in

non-final positions, while (107) shows /q/ as voiceless word-finally:

(106) Non-Word-Final Fronted /q/ --> [g]

/qiΦolo/	[giΦólo]	'coucal bird'
/qinti/	[gínti]	'sand'
/qien/	[gyɪn]	'hair'
/qiet/	[gyɛt]	'mouth'
/qieΦen/	[gyéΦɛn]	'type of flower'
/m-aqi/	[máygi]	'she died'
/oqit/	[ógit]	'Moi people'
/o-oqin/	[wógin]	'it's black'
/m-qit/	[məgít]	'she scratches'
/m-Φqi/	[mΦəgí]	'it's "asleep" (arm/leg)'
/Φagiét/	[Φagyét]	'type of banana'
/oliqlén/	[oligəlén]	'swallow (bird)'
/sisiqár/	[sisigář]	'scrub wren'
/m-siqá/	[msigá]	'it's bad'

(107) Word-Final Fronted /q/ --> [k]

/iiq/	[yik]	'sky'
/qoriq/	[qóřik]	'pig'
/qdoliq/	[qədólik]	'cucumber'
/qiniq/	[gínik]	'sago thorn'
/t-amiq/	[támik]	'my aunt'
/nomiq/	[nómik]	'type of sago palm'
/t-sriq/	[tsəřík]	'I bathe'

Allophone [ʁ]

The fricative allophone [ʁ] (voiced uvular fricative) occurs in all remaining intervocalic positions (i.e. those not adjacent to /i/), as seen in (108) below. In many cases, the intervocalic environment is the result of schwa epenthesis during lexical syllabification.

(108)	/n-aqa/	[náʁa]	'come!'
	/i-oqo/	[yóʁo]	'they drink'
	/t-qaqa/	[təʁáʁa]	'I put it in (container)'
	/t-qni/	[təʁəní]	'I swim'
	/i-qoqo/	[yəʁóʁo]	'they're sick'
	/o-iaqa/	[wiyáʁa]	'he's wicked'
	/o-qoliooo/	[wəʁolyówo]	'he's tired'
	/Φqe/	[ΦəʁéΦ]	'type of clam'
	/Φqeit/	[ΦəʁéytΦ]	'freshwater crab'
	/sqe/	[səʁé]	'honeyeater (bird)'
	/sqemit/	[səʁémit]	'imperial pigeon'
	/óaqe/	[wáʁe]	'when'
	/m-qedi/	[məʁédi]	'it's middle'
	/t-qeΦin/	[təʁéΦin]	'I carry on my back'
	/qaqois/	[qaʁóys]	'tear duct'
	/qtqe/	[qətəʁé]	'gecko lizard'
	/o-qesiq/	[wəʁésik]	'he loves'
	/o-qaliq/	[wəʁálik]	'his side'

/m-qataq/	[məʁátaq]	'it's wide'
/n-qohoq/	[nəʁóhoq]	'you're rich'
/sqaboq/	[səʁábuq]	'wompoo fruit dove'

Allophone [q]

The allophone [q] (voiceless uvular stop) occurs elsewhere (i.e. at word boundaries without adjacent /i/), as seen below:

(109)	/qbahaq/	[qəbáhaq]	'type of lizard'
	/qsiaq/	[qəsyáq]	'bark'
	/qasanaq/	[qasánaq]	'type of frog'
	/qatoq/	[qátoq]	'type of clam'
	/qohoq/	[qóhoq]	'poison'
	/amoq/	[ámoq]	'night'
	/qais/	[qáys]	'tongs'
	/qeΦeis/	[qéΦeys]	'slanted'
	/qemit/	[qémit]	'headband'
	/qeois/	[qéwis]	'type of rattan'
	/qehit/	[qéhit]	'type of fruit'
	/qeiá/	[qeyá]	'carrying bag'
	/qein/	[qéyn]	'first'

The distribution of back stop allophones can be summarized very informally in (110) where (%) indicates mirror image environment.

(110) Back Stop Distribution

a) q --> k % i (Fronting)

b) k --> g / __ V (Voicing)

c) q --> ɣ / V __ V (Voicing & Spirantization)

The above data indicate three processes operating on the back stop: fronting, voicing and spirantization. Fronting and voicing are both induced by proximity to a high front vowel. Spirantization and voicing occur together intervocalically when a high front vowel is not present. These processes can be stated more formally and economically as shown in the following rules:

(111) Voicing I: A back stop which occurs between voiced segments becomes voiced.

$$\begin{matrix} C \\ [+back] \end{matrix} \text{ --> } [+voi] \text{ / } [+voi] \text{ \_\_\_ } [+voi]$$

(112) Voicing II: A back stop followed by /i/ becomes voiced.

$$\begin{matrix} C \\ [+back] \end{matrix} \text{ --> } [+voi] \text{ / \_\_\_ i}$$

(113) Fronting: A back stop adjacent to a high front vowel is fronted to velar position.

$$\begin{matrix} C \\ [+back] \end{matrix} \text{ --> } [+high] \; \% \; \begin{matrix} [+high] \\ [-back] \end{matrix}$$

(114) Spirantization: A back non-high segment becomes fricative intervocalically.

$$\begin{bmatrix} C \\ +back \\ -high \end{bmatrix} \rightarrow [+cont] \; / \; V \_\_\_ V$$

Only two of the above rules are crucially ordered with respect to each other: Fronting bleeds Spirantization. Schwa Epenthesis during lexical syllabification feeds both Voicing I and Spirantization. Consider the following derivation:

(115) Derivation of Back Stop Allophones

Underlying Form	qiniq	m-siqa	qriq	qtqe
Schwa Epenthesis	-	-	qəriq	qətəqe
(				
Voicing I	-	msiGa	-	qətəGe
Voicing II	Giniq	-	-	-
Fronting	ginik	msiga	qərik	-
(				
Spirantization	-	-	-	qətəʁe
Surface Form	ginik	msiga	qərik	qətəʁe
	'thorn'	'it's bad'	'yam'	'lizard'

One cannot reorder Schwa Epenthesis and Voicing I since they occur in different domains – the lexical and post-lexical stages of the phonology. In the following derivation the crucial ordering between Fronting and Spirantization is reversed, and /m-siqa/ 'it is bad' emerges with an incorrect surface form.

(114) Spirantization: A back non-high segment becomes fricative intervocalically.

$$\begin{bmatrix} C \\ +back \\ -high \end{bmatrix} \rightarrow [+cont] \; / \; V \_\_\_ V$$

Only two of the above rules are crucially ordered with respect to each other: Fronting bleeds Spirantization. Schwa Epenthesis during lexical syllabification feeds both Voicing I and Spirantization. Consider the following derivation:

(115) Derivation of Back Stop Allophones

Underlying Form	qiniq	m-siqa	qriq	qtqe
Schwa Epenthesis	-	-	qəriq	qətəqe
(				
Voicing I	-	msiGa	-	qətəGe
Voicing II	Giniq	-	-	-
Fronting	ginik	msiga	qərik	-
(				
Spirantization	-	-	-	qətəʁe
Surface Form	ginik	msiga	qərik	qətəʁe
	'thorn'	'it's bad'	'yam'	'lizard'

One cannot reorder Schwa Epenthesis and Voicing I since they occur in different domains – the lexical and post-lexical stages of the phonology. In the following derivation the crucial ordering between Fronting and Spirantization is reversed, and /m-siqa/ 'it is bad' emerges with an incorrect surface form.

(116) Derivation with Incorrect Rule Ordering

Underlying Form	m-siqá		
Voicing I	msiGá		
Spirantization	msiʁá		
(*			
Fronting	-		
Surface Form	*msiʁá	[msigá]	'it's bad'

Thus, Fronting must precede Spirantization.

Variant [ʔ]

Although most adults adhere to the above processes, many of the younger generation of Haha village, as well as a few younger adults, use a glottal stop [ʔ] instead of the non-fronted back stop allophones [q] and [ʁ], as shown:

(117) Speaker:	Older	Younger	
/qo/	[qo]	[ʔo]	'here'
/qlen/	[qəlɛ́n]	[ʔəlɛ́n]	'bird'
/qɸata/	[qaɸáta]	[ʔaɸáta]	'sago grub'
/qtqe-m/	[qətəʁém]	[ʔətəʔém]	'the gecko lizard'
/qbalaq/	[qəbálaq]	[ʔəbálaʔ]	'thigh'
/n-hnaq/	[nəhənáq]	[nəhənáʔ]	'you give'
/n-qoró/	[noʁoró]	[noʔoró]	'you stand'
/n-aqa/	[náʁa]	[náʔa]	'you come'
/maqán/	[maʁán]	[maʔán]	'dog'

If the back stop is fronted by adjacency to a front high segment, the usual velar allophones result, and there is no distinction between speaker group:

(118) Speaker:	Older	Younger	
/qoriq/	[qóřik]	[ʔóřik]	'pig'
/qiniq/	[gínik]	[gínik]	'sago thorn'
/t-qit/	[təgít]	[təgít]	'I scratch'
/m-aqi/	[mági]	[mági]	'she died'
/m-siqá/	[msigá]	[msigá]	'it's bad'
/moᵑgot/	[móŋgot]	[móŋgɔt]	'large prawn'

Thus, for younger speakers, the following rule applies. The perception among adults, however, is that the process is becoming more deeply rooted among adolescents, and that a growing number of young adults do not speak "correctly."

(119) Glottal Stop: A back segment not adjacent to a high segment is reduced to glottal stop.

Other [g]

There still remain several words having an intervocalic velar stop [g] where the uvular fricative [ʁ] would be expected. It is interesting to note that these exceptions fit into a definite pattern. They only occur in two-syllable words where the first vowel is stressed and back and the second vowel is /o/ and word-final, as seen in (120).

(120) /aqo/ [ágo] 'up there'

/saqo/ [ságo] 'upward' (se aqo = to up there)?

/naqo/ [nágo] 'God' (na aqo = the one up there)?

/oqo/ [ógo] 'banana'

/soqo/ [sógo] 'type of snake'

/na oqo/ [na ógo] 'Serui person'

Where the back stop does not fit the unique and restrictive environment above, it takes on the expected voiced fricative form:[1]

(121) /n-aqa/ [náʁa] 'you come'

/titioqo/ [tityóʁo] 'coconut'

/m-Φaqo/ [mΦáʁo] 'it's damp'

/t-qoqo/ [təʁóʁo] 'I ache'

/sqo/ [səʁó] 'over there'

5.1.2. Unreleased Stop

Stops in word-final position (/t,q/) are unreleased. Optionally, an unreleased stop may release onto a following vowel-initial word.

[1]There is one exception to the above pattern, seemingly contrasting [g] and [ʁ]:

/t-aqo sala/ [tágo sála] 'I burn (garden) (aqo sala = up fire)?

/t-aqo qla/ [táʁo qəlá] 'I drink water (I drown)'

/oqo/ [ógo] 'banana'

/i-oqo/ [yóʁo] 'they drink'

(122)	/m-iq ana/	[mik kána]	'over there'
	/m-leleq oli/	[məléleəq qóli]	'it turns back'
	/m-iq a.../	[mik ka...]	'at uh...'
	/ni i-eit o/	[ni yeyt to]	'the food'
	/m-hot a.../	[məhót ta...]	'we see uh...'

5.2. Optional/Idiolectal Palatal Influences

5.2.1. Fricative Voicing

There are several processes in Imyan Tehit involving the environment of /i/ that are either optional or idiolectal. One such process is the voicing of fricatives that precede /i/, as seen in (123):

(123)	Pronunciation:	A	B	
	/n-eΦiq/	[néΦɪk]	[néβik]	'you chop'
	/m-eΦit/	[méΦit]	[méβit]	'she calls'
	/sisi/	[sísi]	[sízi]	'together'
	/t-qesi/	[təʁési]	[təʁézi]	'my aunt'
	/o-asiq/[2]	[wáysik]	[wáyzik]	'he defecates'

As seen for [sízi] 'together', the process only occurs word-medially. The rule for optional fricative voicing is given below:

[2]The derivation of /o-asiq/ [wáysik] 'he defecates' also involves optional Y Epenthesis.

(126)	/adiát/[4]	[aydyát]	[ayǰát]	'squash'
	/qadió/	[qadyó]	[qaǰó]	'everything'
	/m-idián/	[midyán]	[miǰán]	'it's heavy'
	/t-diere/	[tədyéře]	[təǰéře]	'I meet'
	/n-Φidiáq/	[nΦidyáq]	[nΦiǰáq]	'you vomit'

For the data in (125), a single rule is sufficient:

(127) Alveolar Spirantization: A word-medial voiced alveolar stop [d], if followed by a high front segment /i/ or [y], may optionally become [ǰ].

C	-->	[+cont] / X ___	V
Coronal		[-anterior]	[+high]
[-son]		[+strident]	[-back]
[+voi]			

For the data in (126), however, an additional rule is required to apply after Alveolar Spirantization to delete the glide:

(128) Glide Deletion: A high front glide is deleted following [ǰ].

C	--> Ø /	C	___
[+high]		Coronal	
[-back]		[-anterior]	
		[+strident]	

[4]The derivation of /adiát/ [aydyát] 'squash' also involves optional Y Epenthesis.

5.2.3. Y Epenthesis

One of the most interesting optional processes involves the anticipation of a high front vowel or segment. Specifically, the high front segment in either the onset or the nucleus of a word-final syllable is copied back to form the coda of a penultimate open syllable. In column B of (129) I show Y Epenthesis being triggered by a word-final nuclear [i] or [y], whereas in (130) the coda epenthesis is triggered by a word-final onset [y]:

(129) Y Epenthesis Triggered by Nuclear I or Y

Pronunciation:	A	B	
/o-aqi/	[wági]	[wáygi̲]	'he died'
/t-así/	[tasí]	[taysí̲]	'I go downstream'
/qoli/	[qóli]	[qóyli̲]	'forest spirit'
/todi/	[tódi]	[tóydi̲]	'lowland'
/t-asiq/	[tásik]	[táysi̲k]	'I defecate'
/m-qasiq/	[məʁásik]	[məʁáysi̲k]	'she inserts'
/o-nalit/	[wənálit]	[wənáyli̲t]	'he signals'
/n-alin/	[nálin]	[náyli̲n]	'you go on ahead'
/asiá/	[asyá]	[aysyá]	'type of clam'
/adiát/	[adyát]	[aydyát]	'squash'

(130) Y Epenthesis Triggered by Onset Y

/n-saie/	[nsáye]	[nsáyye]	'you carry at side'
/m-oio/	[móyo]	[móyyo]	'she cooks'
/qaiá/	[qayá]	[qayyá]	'few'

/aií/	[ayí]	[ayyí]	'type of clam'
/baiaq/	[báyaq]	[báyyaq]	'type of rattan'
/naiar/	[náyař]	[náyyař]	'type of hawk'
/qaién/	[qayćn]	[qayyćn]	'rain'

Note that the final syllable glide [y] in (130) must be interpreted as an onset rather than the first segment of a branching nucleus, because the later position would violate the Obligatory Onset Condition. Y Epenthesis in /aií/ 'type of clam' is triggered by either onset or nucleus.

An alternate analysis would posit an underlying y coda that optionally deletes when followed by a word final syllable containing a high front non-coda segment. The problem with this analysis is that there are no examples in Imyan Tehit of penultimate syllables with a [y] coda followed by word-final syllables which do not have a high front vowel nucleus (*qayda, *qaydo, *qayde, etc.). The systematic absence of y codas except in the environment described above argues for Y Epenthesis rather than Y Deletion.

There are a number of limitations placed on the anticipatory Y Epenthesis process. First, the process has only been observed to apply to penultimate syllables having back vowels /a,o/, as was seen in (129) and (130) above. It may be that the front vowels /i,e/ are also included in the process, but that the author could not phonetically distinguish [ey] from [e] or [iy] from [i]. The non-

phonemic schwa, however, is definitely excluded from Y Epenthesis, as seen in (131), a fact that may argue against the supposed status of CV "syllables" created by schwa epenthesis in the lexical phonology.

(131)

Pronunciation: A		B	
/m-Φqi/	[mΦəgí]	*[mΦəygí]	'it's "asleep"'
/o-tli/	[wətəlí]	Ø	'he opens it'
/Φsi/	[Φəsí]	Ø	'type of vegetable'
/qrit/	[qəřít]	Ø	'type of yam'
/qsiaq/	[qəsyáq]	Ø	'bark'
/sris/	[səřís]	Ø	'mouse'

Second, Y Epenthesis is blocked in penultimate closed syllables:

(132)

/Φoldí/	[Φoldí]	*[Φoyldí]	'brush overgrowth'
/t-arΦí/	[tařΦí]	Ø	'I go upstream'

Third, the process has not been observed to cross a labial onset, as illustrated in (133):

(133) Y Epenthesis Blocked by Labial Onsets

Pronunciation: A		B	
/qabí/	[qabí]	*[qaybí]	'area under house'
/Φobi/	[Φóbi]	Ø	'land'
/Φabit/	[Φábit]	Ø	'bandage'
/t-ábien/	[tábyɪn]	Ø	'I pull'
/m-aΦi/	[máΦi]	Ø	'it's sour'

/qaΦiq/	[qáΦik]	Ø	'scrotum'
/Φ-saΦit/	[Φəsáɸit]	Ø	'we dance'
/t-qáΦien/	[təʁáΦyɪn]	Ø	'I carry'
/n-amiq/	[námik]	Ø	'your aunt'
/t-amin/	[támin]	Ø	'I spool-wrap'
/qamií/	[qamyí]	Ø	'very'
/qaoí/	[qawí]	Ø	'heel'

Fourth, Y Epenthesis does not occur if the high segment does not belong to the onset or nucleus of the ultimate syllable, as seen in (134) below. Since the word-final glides in the following examples are in the coda, Y Epenthesis does not apply. This distinction between prevocalic [y] and postvocalic [y] supports the analysis presented in this thesis. Prevocalic [y] and syllabic [i] may both occur in the syllable nucleus; postvocalic [y] is in the coda.

(134)

Pronunciation: A		B	
/blaléin/	[blaléyn]	*[blayléyn]	'type of fern'
/qabléis/	[qabléys]	Ø	'type of tree'
/qaqóis/	[qaʁóys]	Ø	'tear duct'
/t-sqaléis/	[tsəʁaléys]	Ø	'I trade'

Fifth, the process is blocked if the penultimate vowel is /o/ and the word-final syllable is closed, as in (135), but the process is operative if the word-final syllable is open, as in (136).

(135)	Pronunciation: A		B	
	/qdoliq/	[qədólik]	*[qədóylik]	'cucumber'
	/o-oqin/	[wógin]	Ø	'it's black'
	/ronit/	[řónit]	Ø	'cloth sieve'
	/oΦir/	[óΦɪř]	Ø	'type of snail'
(136)	/bosi/	[bósi]	[bóysi]	'maybe'
	/qoli/	[qóli]	[qóyli]	'forest spirit'
	/todi/	[tódi]	[tóydi]	'lowland'

Finally, the process is not operative in antepenultimate syllables, as shown in (137), because the trigger /i/ must occur in the word-final syllable onset or nucleus.

(137)	Pronunciation: A		B	
	/amisiá/	[amisyá]	*[aymisyá]	'echidna (anteater)'
	/t-alioét/	[taliwét]	Ø	'younger sibling'
	/taΦiqát/	[taΦigát]	Ø	'pitohui (bird)'
	/bariniá/	[bařinyá]	Ø	'taboo sign'
	/qadioro/	[qadyóřo]	Ø	'back side'
	/qahiliá/	[qahilyá]	Ø	'last one'
	/t-qoliooo/	[təʁolyówo]	Ø	'I'm tired'
	/t-sqadihóq/	[təʁadihóq]	Ø	'I speak'

In consideration of all the above data, I summarize with the following rule for anticipatory Y Epenthesis:

(138) Y Epenthesis: A non-coda high front segment in word-final syllable may assimilate back across a non-labial onset to form the coda of a penultimate open syllable, except that the process is blocked for a penultimate nucleus /o/ if the word-final syllable is closed.

5.3. Vowel Allophones

5.3.1. Allophone [ɩ]

The dependence of Imyan Tehit vowel allophones on syllable structure is evidenced by the front vowels, which are subject to laxing in closed syllables with varying conditions. For example, the high front vowel /i/ becomes lax [ɩ] before tautosyllabic liquids, as seen in (139).

(139)	/oΦir/	[óΦɩř]	'type of snail'
	/o-amir/	[w-ámɩř]	'he copulates'
	/titir/	[títɩř]	'wall'
	/i-sadir/	[isádɩř]	'they discuss'
	/o-oqir/	[wógɩř]	'heron'
	/qaqir/	[qágɩř]	'palm heart'
	/t-ehir/	[téhɩř]	'I cut (cross grain)'
	/ΦirΦiri/	[ΦɩřΦíři]	'just now'
	/t-adil/	[tádɩl]	'my tongue'
	/tidil/	[tídɩl]	'outrigger peg'

This laxing process does not occur in open syllables, as seen in (140).

(140)	/írooe/	[ířowe]	'quiet'
	/sírere/	[sířeře]	'type of shrimp'
	/m-sirobo/	[msiřóbo]	'she's sleepy'
	/isirián/	[isiřyán]	'honeyeater (bird)'
	/milié/	[milyé]	'rafter top'
	/qahiliá/	[qahilyá]	'last'

Neither does /i/ become lax before non-liquids, as seen in (141). Recall that although non-liquids are restricted from coda position word-medially, they can function as codas word-finally:

(141)	/o-amin/	[wámin]	'he wraps it around'
	/n-tadin/	[ntádin]	'you snore'
	/bis/	[bis]	'type of tree'
	/oelis/	[wélis]	'day after tomorrow'
	/m-tidis/	[mətídis]	'it's stuck'
	/m-Φit/	[mΦit]	'she stones it'
	/danit/	[dánit]	'handle (tool)'
	/qalit/	[qálit]	'tree house'
	/toliq/	[tólik]	'three'
	/m-diq/	[mədík]	'she fills (container)'
	/qariq/	[qářik]	'type of snail'

The above data are accounted for by the following rule:

(142) Lax /i/: A high front vowel becomes lax before a tautosyllabic liquid.

$$\begin{array}{l} V \\ [+high] \\ [-back] \end{array} \quad \text{--> } [-ATR] \text{ / } \_\_\_ \quad \begin{array}{l} C \\ [+son] \\ [+cns] \\ [-nas] \end{array} \quad]\sigma$$

5.3.2. Allophone [ɨ]

It has already been shown that the front glide [y] is an allophone of /i/ in pre-vocalic or post-vocalic position. The central high vowel [ɨ], also an allophone of /i/, only occurs in a branching or complex nucleus functioning as a glide between a labial onset and a back vowel, as seen in (146).

(143)	/qoᵐpia/	[qompɨá]	'type of sago'
	/qbiaq/	[qəbɨáq]	'ashes'
	/sibiar/	[sibɨář]	'wasp'
	/qarmiaq/	[qařmɨáq]	'very'
	/samian/	[samɨán]	'demon'
	/m-mian/	[m̩-mɨán]	'it's dark'
	/t-aoia/	[tawɨá]	'my shadow'
	/qaoiaq/	[qawɨáq]	'until'
	/biolo/	[bɨólo]	'type of bamboo'
	/qabios/	[qabɨós]	'type of lizard'
	/tbio/	[təbɨó]	'fire starter'

/m-Φion/	[mΦiɨón]	'its seed'
/m-saΦion/	[məsaΦiɨón]	'its branch crotch'
/qamiolo/	[qamiɨćlo]	'long ago'

If, however, the glide is not preceded by a labial onset, the glide does not assimilate to the following vowel:

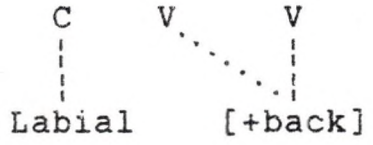
(144)	/adiat/	[aydyát]	'squash'
	/Φ-diolo/	[Φədyólo]	'we (incl.) hunt'
	/t-qosia/	[təʁosyá]	'I lift away'
	/t-siolon/	[tsyólon]	'I pierce'
	/miniaq/	[minyáq]	'fat'
	/m-henio/	[məhenyó]	'she's pretty'
	/qahilia/	[qahilyá]	'last'
	/o-qolioq/	[wəʁolyóq]	'he hangs it up'

If the vowel following the glide is front, as in (145), the glide remains front [y].

(145)	/qᵐpie/	[qəmpyé]	'fish fence'
	/biele/	[byéle]	'garden'
	/t-sibiele/	[tsibyéle]	'my back'
	/t-bieis/	[təbyéys]	'I dig by hand'
	/qatiΦie/	[qatiΦyé]	'spit'
	/qamii/	[qamyí]	'very'

The above data are accounted for by the following rule:

(146) Glide Assimilation: Non-nuclear /i/ preceded by a labial assimilates the feature [back] of the following vowel.



5.3.3. Allophone [ɛ]

The non-high front vowel /e/ becomes lax [ɛ] in simple closed syllables of non-suffixed words, as shown in (147):

(147)	/t-qader/	[təʁádɛř]	'I scream'
	/n-eoer/	[néwɛř]	'move!'
	/eroás/	[ɛrwás]	'animal'
	/ahel/	[áhɛl]	'cuckoo dove'
	/leoel/	[léwɛl]	'cassowary tree'
	/qaΦel/	[qáΦɛl]	'mudhopper (fish)'
	/nen/	[nɛn]	'you'
	/oesen/	[wésɛn]	'rainbow'
	/o-hares/	[wəhářɛs]	'he's generous'
	/m-hes/	[məhés]	'she's shy'
	/qma tes/	[qəmá tés]	'houseboat'
	/breΦ/	[brɛΦ]	'jaw harp'
	/ŋgaréΦ/	[ŋgařéΦ]	'arrow'
	/aoet/	[áwɛt]	'cockatoo'
	/bet/	[bɛt]	'mud'

If, however, /e/ occurs before the suffix coda [m,w,y] which denotes third person referent number and gender, laxing does not apply:

(148)	/m-bahe-m/	[ɱbáhem]	'she orders her/it'
	/t-ɸe-m/	[təɸém]	'I own it (fem.)'
	/t-ɸe-o/	[təɸéw]	'I own it (masc.)'
	/biele-o/	[byélew]	'garden (masc.)'
	/m-bahe-i/	[ɱbáhey]	'she orders them'
	/t-ɸe-i/	[təɸéy]	'I own them'

Neither does /e/ laxing occur before the glide of a complex coda:

(149)	/ɸ-eit/	[ɸéyt]	'we eat'
	/t-heit/	[təhéyt]	'I stay'
	/qreit/	[qəréyt]	'type of sago palm'
	/m-brieis/	[ɱbřyéys]	'it's upside down'
	/qaɸeis/	[qáɸeys]	'boil'
	/t-bieɪs/	[təbyéys]	'I dig by hand'
	/o-hein/	[wəhéyn]	'he carves'
	/blalein/	[blaléyn]	'type of fern'
	/t-qeɪn/	[təʁéyn]	'I pull'

The fact that laxing does not occur before the high glides [w,y] is not surprising since these consonants carry the advanced tongue root [+ATR] attribute of their corresponding high vowels. The anomalous non-laxing of /e/

before heteromorphemic /m/, may indicate that the suffix is a clitic. The above data is accounted for by the following rule:

(150) Lax /e/: The non-high front vowel /e/ becomes lax before a tautosyllabic and tautomorphemic consonantal.

$$V \text{ (}[-high]\ [-back]\text{)} \rightarrow [-ATR] \ / \ \_\_\_ \ C\ [+cns]\ ]\sigma$$

Two options exist for syllable-nuclear /e/ with back stop codas: either schwa epenthesis or laxing, as seen in (151).

(151)

Pronunciation	A	B	
/t-heq/	[təhéəq]	[təhɛ́q]	'my tooth'
/m-treq/	[mətəřéəq]	[mətəřɛ́q]	'it's muddy'
/sdeq/	[sədéəq]	[sədɛ́q]	'small'
/qleq/	[qəléəq]	[qəlɛ́q]	'crack'
/m-qaréq/	[məʁařéəq]	[məʁařɛ́q]	'she's stingy'
/m-qleq/	[məʁəléəq]	[məʁəlɛ́q]	'it's torn'
/o-qeseq/	[wəʁéseəq]	[wəʁésɛq]	'he peels it'
/m-Φaleq/	[mΦáleəq]	[mΦálɛq]	'it's empty'
/m-eleq/	[méleəq]	[mélɛq]	'it's white'
/lemeq/	[lémeəq]	[lémɛq]	'pounding tool'

The more common process is the epenthesis of schwa between the nucleus and coda, functioning as a phonetic glide assisting in the transition from front to back

articulation. Of interest here, is that schwa epenthesis blocks the nucleus from laxing because it is no longer adjacent to the coda. In the absence of schwa epenthesis, laxing applies.

Transitional schwa epenthesis also occurs across word boundaries, as illustrated in (152).

(152) /t-rie qa/ [təryé əqá] 'I uproot taro'
/biele qo/ [byéle əqó] 'this garden'
/m-se qla/ [mséə qəlá] 'to the water'
/Φe qma-m/ [Φéə qəmám] 'for the canoe'
/o-ase qat/ [wáse əqát] 'he lives far away'
/ni hre qe/ [ni həré əqé] 'these things'

The rule for transitional schwa epenthesis. given in (153), is postlexical, operating in phrasal domain environments that may cross word boundaries.

(153) Transitional Schwa Epenthesis: A schwa may optionally epenthesize between a non-high front tense vowel and a following back stop.

$$\emptyset \rightarrow ə \; / \; \begin{matrix} V \\ [-high] \\ [-back] \\ [+ATR] \end{matrix} \; \_\_\_\_ \; \begin{matrix} C \\ [+back] \end{matrix}$$

In addition to /e/ laxing in closed syllables, the allophone [ɛ] also occurs in open syllables before /r/, as seen in (154). In open syllables preceding /l/, however, laxing does not apply. These facts are summarized by (155).

(154)

/erén/	[ɛřén]	'fish'
/ᵐperit/	[ɱpéřit]	'crowned pigeon'
/t-erés/	[tɛřés]	'I open'
/deri/	[déři]	'just'
/o-bere/	[wəbéře]	'he commands'
/n-siere/	[ŋsyéře]	'cross over!'
/sieren/	[syéřɛn]	'papaya'
/qdiere/	[qədyéře]	'cliff'
/m-oere/	[ɱwéře]	'she turns off (path)'
/t-leli/	[təléli]	'I sit'
/n-elin/	[nélin]	'you (pl.) lead'
/biele/	[byéle]	'garden'
/m-eleq/	[méleq]	'it's white'
/n-selo/	[ŋsélo]	'you throw'

(155) /r/ Induced Lax /e/ - A non-high front vowel /e/ preceding /r/ becomes lax.

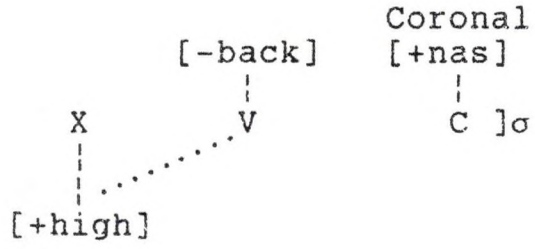
$$\begin{bmatrix} V \\ -high \\ -back \end{bmatrix} \rightarrow [-ATR] \; / \; \underline{\quad} \; \begin{bmatrix} C \\ +son \\ +cns \\ -nas \\ -lat \end{bmatrix}]_{\sigma}$$

I have shown that the lax high front vowel [ɪ] occurs in closed syllables with liquid codas /r/ and /l/. It also occurs in closed syllables with coda /n/, provided it is preceded by a high front segment:

(156)	/qaién/	[qayɪ́n]	'rain'
	/tiién/	[tiyɪ́n]	'stick'
	/Φien/	[Φyɪn]	'together'
	/hrién/	[həryɪ́n]	'things'
	/dlién/	[dlyɪ́n]	'ironwood'
	/m-esién/	[mesyɪ́n]	'it's egg'
	/n-sin/	[n̥sín]	'you plan'
	/t-lin/	[təlín]	'I skin (animal)'
	/m-looin/	[məlówin]	'it's shady'
	/n-qomin/	[nəʁómin]	'you're cold'

Here, the interpretation is not that the lax vowel is derived from /i/ in direct laxing, but rather from /e/ through two processes – laxing and raising. First /e/ is laxed to [ɛ] in the closed syllable. Then the vowel is raised to [ɪ] by anaphoric assimilation with a preceding high front segment, as given by (157):

(157) Front Vowel Raising: A front vowel is raised if it is preceded by a high segment and followed by tauto-syllabic /n/.



The above raising rule necessarily follows laxing. If vowel raising came first, then laxing could not apply because the rule for laxing /i/ requires a liquid coda.

5.3.4. Allophone [u]

It has already been shown that the back glide [w] is the non-nuclear allophone of /o/, as determined by the syllable structure. Unstressed /o/ can also exhibit an optional raised nuclear allophone /u/, but only in an extremely unique environment – in a closed syllable with a labial consonantal onset and back coda – as illustrated in (158).

(158)

Pronunciation	A	B	
a) /amoq/	[ámoq]	[ámuq]	'night'
/t-amoq/	[támoq]	[támuq]	'my uncle'
/qramoq/	[qərámoq]	[qərámuq]	'yesterday'
/sqaboq/	[səʁáboq]	[səʁábuq]	'fruit dove'

	/seramoq/	[sɛřámoq]	[sɛřámuq]	'river name'
	/m-omoq/	[mómoq]	[mómuq]	'it's ripe'
b)	/saooq/	[sáwoq]	Ø	'tomorrow'
	/iooɔq/	[yówoq]	Ø	'leech'
c)	/t-qodoq/	[təʁódoq]	Ø	'I press in'
	/t-sqasoq/	[tsəʁásoq]	Ø	'I lean'
	/Φ-sioloq/	[Φəsyóloq]	Ø	'we (incl.) descend'
	/i-qohoq/	[yəʁóhoq]	Ø	'they're rich'
	/o-altoroq/	[waltóřoq]	Ø	'he cuts'
d)	/m-soΦot/	[məsóΦot]	Ø	'it restrains'
	/n-qomot/	[nəʁómot]	Ø	'you help'
	/t-hobor/	[təhóboř]	Ø	'I wrap it'
e)	/moq/	[moq]	Ø	'moon'
	/Φoq/	[Φ̈oq]	Ø	'type of banana'
	/t-qomóq/	[təʁomóq]	Ø	'I bake in coals'
	/qrmoq/	[qəřəmóq]	Ø	'moss'
f)	/boqiét/	[bogyét]	Ø	'roof end'
	/Φoqár/	[ΦoʁáŘ]	Ø	'race name'
	/i-Φoqóq/	[yəΦoʁóq]	Ø	'they tie'

Back vowel raising does not occur if the preceding labial is a glide [w] (158b), the preceding onset is non-labial (158c), the coda is not back (158d), the syllable is

stressed (158e), or the syllable is open (158f). The rule for back vowel raising is given below:

(159) Back Vowel Raising: A nuclear /o/ in an unstressed closed syllable with labial consonantal onset and back coda may optionally be raised.

$$\begin{array}{l} \text{V} \\ [\text{+back}] \\ [\text{-low}] \\ [\text{-stress}] \end{array} \text{ --> } [\text{+high}] \text{ / } \begin{array}{l} \text{C} \\ [\text{+cns}] \\ \text{Labial} \end{array} \text{ \_\_\_\_ } \begin{array}{l} \text{C} \\ [\text{+back}] \end{array} \text{]}\sigma$$

5.3.5. Degenerate Vowel Assimilation

The non-phonemic epenthesized schwa [ə] often takes on the qualities of the following vowel or glide. Before [w] (i.e. non-nuclear /o/), it can surface as phonetic [u], as seen in (160). Stressed [u] only occurs in words of non-Tehit origin, usually borrowings from Malay such as /túwoq/ (from /túwak/) 'palm wine', /júmat/ 'Friday', and /búku/ 'book'.

(160)

Pronunciation	A	B	
/n-oit/	[nəwít]	[nuwit]	'you call'
/t-oet/	[təwét]	[tuwét]	'I am small'
/n-oien/	[nəwyín]	[nuwyín]	'you get'
/t-oan/	[təwán]	[tuwán]	'I expel'
/n-oare/	[nəwáře]	[nuwáře]	'you wash'
/t-oaran/	[təwářan]	[tuwářan]	'my collar bone'
/t-oere/	[təwéře]	[tuwéře]	'I turn aside'

/m-toaq/	[mətəwáq]	[mətuwáq]	'it's broken'
/loa/	[ləwá]	[luwá]	'snake'
/o-loa/	[wələwá]	[waluwá]	'he's good natured'
/soar/	[səwář]	[suwář]	'fruit bat'

Considering the data in (161), it is clear, however, that the phonemic vowel /o/ does not assimilate the qualities of a following [w] (non-nuclear /o/):

(161)	/qooán/	[qowán]	*[quwán]	'friend'
	/tooón/	[towón]	*[tuwón]	'star'
	/irooé/	[iřowé]	*[iřuwé]	'quiet'
	/qadooáq/	[qadowáq]	*[qaduwáq]	'tuber'
	/Φ-ooá/	[Φowá]	*[Φuwá]	'we (incl.) cry'
	/tooá/	[towá]	*[tuwá]	'bee'
	/dooás/	[dowás]	*[duwás]	'cane grass'
	/t-qooér/	[təʁowɛ́r]	*[təʁuwɛ́r]	'I move it aside'
	/o-tooeit/	[wətowéyt]	*[wətuwéyt]	'it flashes'
	/o-ooo/	[w-ówo]	*[wúwo]	'it is round'
	/iooоq/	[yówoq]	*[yúwoq]	'leech'
	/qooon/	[qówon]	*[qúwon]	'bamboo strip'
	/m-looin/	[məlówin]	*[məlúwin]	'it's shade'

The effects on schwa by a following front glide [y] or vowel is clearly seen in (162a-e). Schwa can optionally take on the quality of a following non-consonantal. It appears, however, that assimilation of the following vowel

is not possible if an intervening consonant is not a continuant, as seen in (162f).

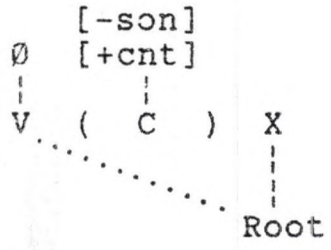
(162) Optional Non-consonantal Assimilation by Schwa

a)	/t-ɪan/	[təyán]	[tiyán]	'I rub'
	/o-iaqa/	[wəyáʁa]	[wiyaʁa]	'he's wicked'
b)	/o-sirobo/	[wəsiřóbo]	[wisiřóbo]	'he's sleepy'
	/o-sitolo/	[wəsitólo]	[wisitólo]	'he's thirsty'
c)	/Φ-heit/	[Φəhéyt]	[Φehéyt]	'we (incl.) wait'
	/t-heq/	[təhéəq]	[tehéəq]	'my tooth'
d)	/m-Φaleq/	[məΦáleq]	[maΦáleq]	'its bark'
	/m-saq/	[məsáq]	[masáq]	'it's lost'
	/n-qaΦe/	[nəʁáΦe]	[naʁáΦe]	'you carry'
	/n-qani/	[nəʁáyni]	[naʁáyni]	'you're sick'
	/i-qaq/	[yəʁáq]	[yaʁáq]	'they dig up'
e)	/t-hano/	[təháno]	[taháno]	'my younger sister'
	/t-qodois/	[təʁodóys]	[toʁodóys]	'my bone'
	/n-qoró/	[nəʁořó]	[noʁořó]	'stand!'
	/m-hoq/	[məhóq]	[mohóq]	'we (excl.) arrive'
	/t-hot/	[təhót]	[tohót]	'I see'
f)	/t-bait/	[təbáyt]	*[tabáyt]	'I play'
	/m-rana/	[məřána]	*[mařána]	'she tells'
	/m-to/	[mətó]	*[motó]	'she says'
	/t-noq/	[tənóq]	*[tonóq]	'I know'
	/t-bere/	[təbéře]	*[təbéře]	'I order'
	/m-leli/	[məléli]	*[meléli]	'she sits'

/t-di/	[tədí]	*[tidí]	'I fall'
/o-lis/	[wəlís]	*[wilís]	'he's tall'

The above vowel assimilation data are accounted for by the following rule, assuming that only vowel features can spread to the degenerate syllable nucleus (V linked to Ø):

(163) Optional Degenerate Vowel Assimilation: A degenerate syllable nucleus may optionally assimilate to the following non-consonantal if an intervening consonant is continuant.



REFERENCES

Animung, L. dan Don A.L. Flassy. 1987. Struktur bahasa Seget. Projek Penelitian Bahasa dan Sastra Indonesia dan Daerah Jakarta.

Bagemihl, Bruce. 1991. Syllable Structure in Bella Coola. Linguistic Inquiry 22:589-646.

Bell, Alan and Mohamad M. Saka. 1983. Reversed sonority in Pashto initial clusters. Journal of Phonetics 11:259-75.

Berry, Kieth and Christine Berry. 1987. A survey of some West Papuan Phylum Languages. Workpapers in Indonesian Languages and Cultures 4:25-117. Jayapura: Summer Institute of Linguistics - Cenderawasih University Press.

Bloch, Bernard and Trager, George. 1942. Outlines of Linguistic Analysis. Baltimore: LSA Special Publication.

Bloomfield, Leonard. 1933. Language. New York: Henry Holt.

Brown, William U. 1991. A Quantitative Phonology of Mai Brat. Pacific Linguistics, Series A 73:1-27.

Clements, G.N. and S.J. Keyser. 1983. CV Phonology: a Generative Theory of the Syllable. Linguistic Inquiry Monograph No. 9. Cambridge, Massachusettes: MIT Press.

Clifton, John M. 1987. Vowel Sequences in CV Phonology. Paper presented to the Linguistic Society of Papua New Guinea.

Deligiorgis, Ioanna. 1990. Maximality and Glides. Chicago Linguistics Society 26:81-95.

Flassy, Don A.L. 1978. Analisa struktur bahasa Tehid dalam kaitannya dengan pengajaran bahasa Indonesia. Jogjakarta. (Ms.)

Flassy, Don A.L. 1979a. Struktur bahasa Tehid: daftar kosa kata. Jogjakarta: FKSS-IKIP. (Mimeo.)

Flassy, Don A.L. 1979b. Struktur bahasa Tehid: folklore. Jogjakarta: FKSS-IKIP. (Mimeo.)

Flassy, Don A.L. 1981. Struktur bahasa Tehid. Jakarta: Pusat Bahasa.

Flassy, Don A.L. 1983. Fonologi bahasa Mooi. Ambon: LEKNAS/LIPI.

Flassy, Don A.L. 1991. Grammar Sketch of Tehit, a Toror Language, the West Doberai Peninsula, New Guinea (Irian Jaya). Masters thesis, Leiden University, Netherlands.

Flassy, Don A.L. and W.A.L. Stokhof. 1979. A note on Tehit. NUSA 7:35-83.

Foley, Willam A. 1986. The Papuan Languages of New Guinea. Cambridge: Cambridge University Press.

Goldsmith, John A. 1990. Autosegmental and Metrical Phonology. Cambridge, Massachusetts: Basil Blackwell Inc.

Greenberg, J. 1978. Some generalizations concerning initial and final consonant clusters. Universals of Human Language. vol. 2, p. 243-279, ed. by J. Greenberg. Stanford: Stanford University Press.

Heikkinen, Helja and Peter J. Silzer. 1984. Index of Irian Jaya Languages. Irian: Bulletin of Irian Jaya 12:96,124-I. Program Kerjasama Universitas Cenderawasih dan Summer Institute of Linguistics.

Hesse, Ronald G. and Min Young Jung. 1988. Tehit Survey Report. (Ms.) Program Kerjasama Universitas Cenderawasih dan Summer Institute of Linguistics.

Hyman, Larry M. 1990. Non-Exhaustive Syllabification: Evidence from Nigeria and Camaroon. Chicago Linguistic Society 26:175-196.

Ichwan Ansani dan Ch. Fautngil. 1983. Struktur bahasa Mooi: Fonologi. Projek Penelitian Bahasa dan Sastra Indonesia dan Daerah Jakarta.

Ichwan Ansani dan Ch. Fautngil. 1984. Struktur bahasa Mooi: Morfologi. Projek Penelitian Bahasa dan Sastra Indonesia dan Daerah Jakarta.

Itô Junko. 1986. Syllable Theory in Prosodic Phonology. Ph.D. dissertation. University of Massachusetts, Amherst.

Irvin, J. 1987. Between Epenthetic and Excrescent Vowels (or What Happens after Redundancy Rules), in M. Crowhurst, ed., Proceedings of the West Coast Conference on Formal Linguistics 6. Stanford Linguistics Association, Stanford, California.

Purba, T. dan Lisidius Animung. 1983. Struktur bahasa Klabra: Fonologı. Projek Penelitian Bahasa dan Sastra Indonesia dan Daerah Jakarta.

Purba, T. dan Lisidius Animung. 1984. Struktur bahasa Klabra: Morfologi. Proyek Penelitian Bahasa dan Sastra Indonesia dan Daerah Jakarta.

Regnier, Sue. 1993. Quiegolani Zapotec Phonology. Work Papers of the Summer Institute of Linguistics, University of North Dakota Session, Vol 37:37-63. University of North Dakota.

Selkirk, Elizabeth, O. 1982. The Syllable. In van der Hulst and Smith. The Structure of Phonological Representations, part 2, pp. 337-83.

Voorhoeve, C.L. 1975a. Languages of Irian Jaya: Checklist, Preliminary Classification, Language Maps, Wordlists. Pacific Linguistics, Series B 31:117.

Wurm, Stephen A. and Shiro Hattori. 1981. Language Atlas of the Pacific Area. Canberra: Australian Academy of Humanities.